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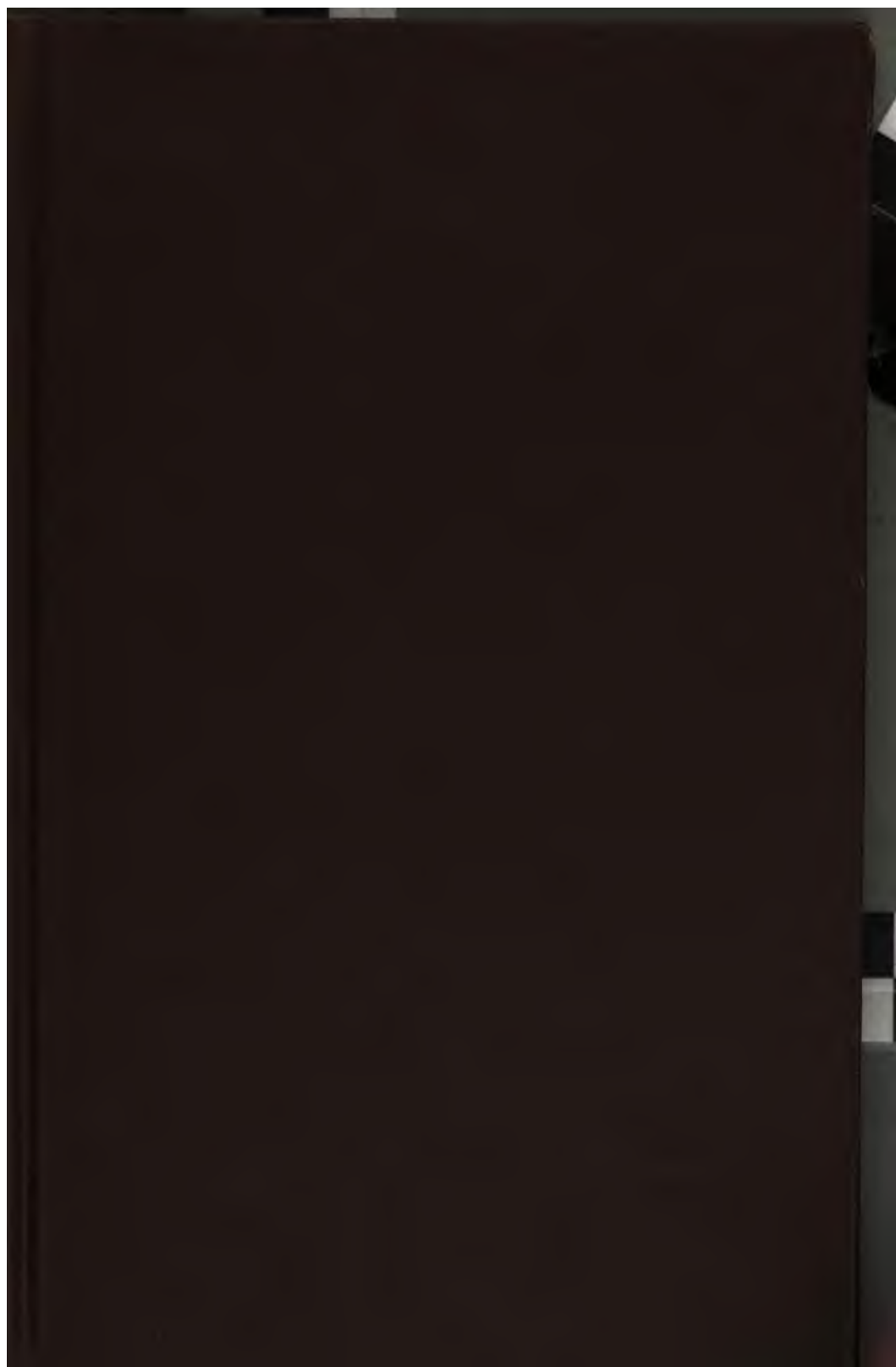
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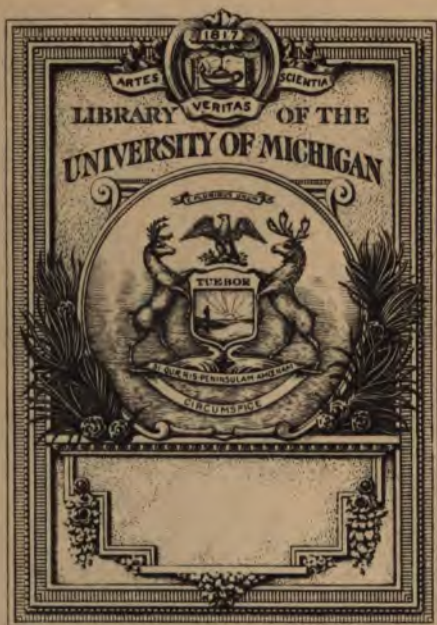
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A
L E T T E R

T O

MARTIN FOLKES, Esq;

President of the ROYAL SOCIETY,

CONCERNING

The Rise and Progress of ASTRONOMY
amongst the *Antients*.

by
David Hume

Nec tamen istas Quæstiones Physicorum exterminandas puto: est enim Animorum Ingeniorumque naturale quoddam quasi Pabulum Consideratio Contemplatioque Naturæ. Erigimur; altiores fieri videmur; Humana despiciamus; cogitantesque Supera atque Cœlestia, hæc nostra, ut exigua & minuma, contemnimus. Indagatio ipsa Rerum tum maxumarum, tum etiam occultissimarum, habet Oblectationem: si vero aliquid occurret, quod verisimile videatur; humanissima completur Animus Voluptate.

TULL. ACADEM.

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(I)

S I R,

THAT the *Greeks* borrow'd the Foundation of their Astronomical Skill from the *Egyptians* and *Babylonians*, is a Point in which all their Writers are universally agreed, and need not be prov'd to one so well acquainted with them as Yourself. This Concession of theirs, and the Want of understanding it with its proper and necessary Restrictions, has contributed amongst almost all Sorts of Writers to rob them of that Reputation they undoubtedly deserved. 'Tis to the happy Genius of that once glorious People, and that People alone, that we owe all that can properly be stil'd *Astronomy*; and 'tis but just to

B restore

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restore to them the Honour they have been so long depriv'd of. But in order to do this, we shall be at first oblig'd to step back into the remote and fabulous Ages of Antiquity, and for one while as it were feel our Way in the Dark. Tedious and comfortless as this may be, we shall however, as we advance, have the Pleasure to see the Morning of Science breaking in upon us at a Distance, and gradually increasing in Brightness, till at last it shines in the full Meridian Lustres, in which we now enjoy it.

THAT Mankind began very early to lift up their Eyes to the Heavens, and observe that beautiful Canopy so richly adorn'd, is not at all surprizing; but that these Observations, before the Flood at least, contain'd any Thing more than meer Curiosity, may very easily be doubted. *Josephus*, fond of raising the Credit, of his Nation, will needs make the immediate Descendants of *Seth* the original
Authors

Authors of *Astronomy*. If he may be credited, they wrote too their Observations upon Pillars, one of Brick, and another of Stone, to preserve them secure against the Destruction, which *Adam*, it seems, had foretold them should, some time or other, put an End to all Things. (a) The Extravagance and Inconsistency of this

B 2 whole

(a) Σοφίαν τε τὴν περὶ τὰ ὑράνια καὶ τὴν τῆς διακόσμησιν ἐπενόησαν· ὑπὲρ δὲ τῆ μη διαφυγεῖν τῆς Ἀνθρώπου τὰ εὐρημένα μηδὲ πρὶν εἰς γινῶσιν ἐλθεῖν φθαρῆναι προειρηκότῃ ἀφανισμόν Ἀδάμ τῶν ὅλων ἔσσεσθαι, τὸν μὲν κατ' ἰσχὺν πυρὸς, τὸν ἕτερον δὲ κατὰ βίαν καὶ πληθὺν ὕδατος, ἑήλας δύο ποιησάμενοι τὴν μὲν ἐκπλίνθαι τὴν δ' ἐτέραν ἐκ λίθων, ἀμφοτέραις ἐνέγραψαν τὰ εὐρημένα. ἵν' εἰ καὶ συμβῇ τὴν πλινθίνην ἀφανισθῆναι ὑπὸ τῆς ἐπομβρίας, ἡ λιθίνη μείνασα παρασχη μαθεῖν τοῖς Ἀνθρώποις τὰ ἐγγεγραμμένα, δηλῶσα καὶ πλινθίνην δ' ὑπ' αὐτῶν ἀνατεθῆναι. μένει δ' ἄχρι τῆ δεῦρο κατὰ γῆν τὴν Σιριάδα. *Antiq. L. 1. C. 2.* But it may reasonably enough be ask'd, where that *Land of Siriad* is; how in an ἀφανισμῷ τῶν ὅλων these Pillars could escape; or who were to enjoy the Benefit of the Knowledge they convey'd? See more on this Subject in *Stillingfleet's* Orig. Sac. Book 1. Ch. 2.

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whole Account is such, as will justly excuse the saying any Thing farther upon it.

THIS necessarily brings us down to the Times on this Side the Deluge, the highest that Arts and Sciences of any Kind can pretend to go. But here again the *Egyptians* laying Claim to the original Invention of them, (as indeed to the greatest Antiquity as a Nation) the same
Jewish

'Tis not improbable that *Josephus* applies to *Seth*, what he found in *Manetho* concerning *Thoth*. This *Manetho* liv'd under *Ptolemy Philadelph.* and is said in *Euseb.* Chron. L. 1. p. 6. Ἐκ τῶν Μανεθῶ τῷ Σεβεννύτῃ ὃς ἐπὶ Πτολεμαίῳ τῷ Φιλαδέλφῳ ἀρχιερεὺς τῶν ἐν Αἰγύπτῳ εἰδώλων χρηματίσας ἐκ τῶν ἐν τῇ Σηριαδικῇ γῇ κειμένων σφλῶν ἱερῶν, Φησὶ, διαλέκτῳ καὶ ἱερογραφικοῖς γράμμασι κεκαρακλισμένων ὑπὸ Θωῦθ τῷ πρώτῳ Ἑρμῆ καὶ ἑρμηνευθεῖσων μετὰ τὸν κατακλυσμὸν ἐκ τῆς ἱερᾶς διαλέκτου εἰς τὴν ἑλληνίδα φωνὴν γράμμασιν ἱερογλυφικοῖς καὶ ἀποτεθεισὼν ἐν βίβλοις ὑπὸ τῷ Ἀγαθοδαίμονι τῷ δευτέρῳ Ἑρμῆ, Παῖρὸς δὲ τῷ Ταῦτ ἐν τοῖς ἀδύτοις τῶν ἱερῶν Αἰγυπτίων, ἃ προσεφώνησέ τῳ αὐτῷ Φιλαδέλφῳ βασιλεῖ δευτέρῳ Πτολεμαίῳ, ἐν τῇ βίβλῳ τῆς Σώθews γράφων ὕτως, &c.

Jewish Historian, keeping still the same Point in View, appears ready to contest it with them. The Patriarch *Abraham*, if he may be heard, introduc'd the Knowledge of the Heavens into *Egypt*. (b) His Father *Terah*, according to the *Eastern* Writers (c), to make this the more probable, was a Maker of *Talismans*, or little Images form'd in some particular planetary Hour. But that the Motions of the *Planets* were at all known so early as this, much less their *Dominion*, or *Astrological Influences*, so much as dreamt of, is

(b) Τὴν τε Ἀριθμητικὴν αὐτοῖς χαρίζεται καὶ τὰ περὶ Ἀστρονομίας παραδίδωσι· πρὸ γὰρ τῆς Αβραάμ παρυσίας εἰς Ἀιγυπτίου, Αἰγύπτιοι τέτων ἔχον ἀμαθῶς. ἐκ Χαλδαίων γὰρ ταῦτ' ἐφοίτησεν εἰς Ἀιγυπτίον ὅθεν ἦλθε καὶ εἰς τοὺς Ἕλληνας. *Antiq. L. 1. C. 8.*

(c) *Hyde's Relig. Antiq. Perf. p. 63. 68. and Philo* says, Περὶ Ευγενείας τῶ τῶν Ἰουδαίων ἔθνους οὗ Προσβύτατος γένος μὲν ἦν Χαλδαῖς παῖρὸς δὲ ἀστρονομικῶν, τῶν περὶ τὰ μαθήματα διαδιδόντων, οἱ τὰς ἀστέρας θεοὺς νομίζουσι, καὶ τὸν σύμπαντα οὐρανὸν τε καὶ κόσμον. παρ' ὧν τὸ τὸ εὖ καὶ το χεῖρον ἐκάστοις φησὶν ἀποβαίνειν, ὅθεν ἔξω τῶν αἰσθητῶν αἰτίων ὑπαλαμβάοντες εἶναι. *Tom. 2. p. 442. Edit. 1742.*

The same Passage occurs again περὶ κοσμῶ. P. 602.

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is more than can be made appear by any Argument worth attending to, and may be justly look'd on, as one of the many Romances, to be met with in the Historians of that Part of the World.

BUT tho' whether this Science was introduced into *Egypt* by *Abraham*, or to speak more properly, whether the Practice of observing the Heavens, was even so much as known there in his Time, may deservedly be question'd, yet since the *Greeks*, as was said, allow it to have began there, and to have come to them from thence, let us see what Accounts we can meet with, of its Rise and Progress amongst these Descendants of *Ham*.

AND here, according to the Custom of that People, we shall meet with every Thing vast and extravagant. The Histories of their Dynasties I omit taking Notice of, as not falling in with my present Design. Besides, the Canon from which they

they are chiefly taken by *Syncellus*, tho' by him call'd *Qld*, was compos'd but fifteen Years before *Alexander's* Expedition against the *Persians*, or in the third Year of the CVIth Olympiad, according to Sir *John Marsham* (*d*), and consequently after the *Egyptians* had corrupted their Chronology. For the same Reason I pass over likewise their Three Hundred and Thirty Kings, that, according to *Mela*, (*e*) they said reign'd before *Amasis*, under whom they were conquered by *Cambyses*, and their regular Annals for Thirteen Thousand Years before that Time, as being of a Piece with
what

(*d*) Page 2.

(*e*) *Ipsi vetustissimi, ut prædicant, Hominum, trecentos & triginta Reges ante Amasin, & supra tredecim millium annorum ætates, certis Annalibus referunt. Mandatumque Literis servant, dum Ægypti sunt, quater Cursus suos vertisse sidera, ac Solem bis jam occidisse, unde nunc oritur. L. I. c. 3.*

If this last Observation be not an entire Fiction, the Method of accounting for so extraordinary a

Phæno-

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what they affirm in the same Author, that during that Period the Stars had four Times chang'd their Course, and the *Sun* set twice in the *East*.

ABSURD as this may seem, we shall find the same Fictions continued in other Authors, where they tell us, as *Dicaearchus* (*f*) doth, that after *Orus* the Son of *Ifis* reign'd *Sefonchos*, and that from him

Phænomenon must be, I suppose, by imagining that the Authors of this Account sail'd down the *Red Sea*, and either coasting *Africa*, enter'd *Egypt* again by one of the Mouths of the *Nile*; or, what is more probable, going Eastward, and up the *Euphrates*, return'd home again the same Way.

(*f*) Δικαίαιρχος ἐν πρώτῳ, says the *Scholiast* on *Apollonius's Argonauts*, μετὰ τὸν Ἰσίδον καὶ Ὀσίριδον Ὀρον βασιλεία γενομένη Σισόγγχωσιν λέγει. Ὡς γίνεσθαι ἀπὸ τῆς Σισογγώσιδος βασιλείας μέχρι τῆς Νείλου ἔτη δισχίλια Φ, ἀπὸ δὲ τῆς Νείλου βασιλείας, μέχρι τῆς πρώτης Ὀλυμπιάδος ἔτη, υλς, ὡς εἶναι τὰ πάντα ὁμῶς, ἔτη δισχίλια ἑννακόσια λς. Page 186.

By *Ifis* and *Orus* may perhaps be meant the Moon (♄♂) and the Sun, (♌♂) *Orus* may be stil'd the Son of *Ifis*, either from the Method of reckoning the

him to *Nilus* were 2,500 Years. This *Nilus*, according to *Laertius*, (g) was
 C the

the Night before the Day, as in *Gen.* ch. 1. and as probably the *Egyptians* did; or because they computed their Time by Lunar Years, before they became acquainted with the *Solar*. It may not be improbable, that the Reign of *Sesonchosis* is plac'd immediately after that of *Orus*, because the *Egyptian* Accounts of their Kings went no higher than his Time; or, because it was then that *Egypt* was first united under one Monarch. That *Egypt* about that Time (if *Sesonchosis* and *Shishak* be the same) underwent a Revolution of some Sort or other, will, I think, appear from hence. When *David* conquered the *Edomites*, *Hadad*, a Child of their Royal Family, was carried into *Egypt*; and when he grew up, married *Tabpenes*, a Sister of *Pharaoh's* Queen, 1 *Kings* 11. 17, 19. But *Solomon*, in the Beginning of his Reign, married a Daughter of *Pharaoh*, ch. 3. 1. and towards the latter End of his Reign *Shishak*, then King of *Egypt*, gave Entertainment to *Jeroboam*, who was forming Designs against *Solomon's* Government, ch. 11. 40. and afterwards conquered his Son *Rehoboam*, ch. 14. 25. *Shishak*, therefore, could hardly be a Prince of the same Family, to which *Solomon* was so nearly allied.

(g) Νείλη γενέσθαι παῖδα "Ηφαιστον, ὃν ἀρξαι
 Φιλοσοφίας, ἥς τὴς πρὸ δὲ ἐσώτας ἱερέας εἶναι καὶ Προ-
 φήτας· ἀπὸ δὲ τούτου εἰς Ἀλέξανδρον τὸν Μακεδόνα,
 ἐτῶν εἶναι μυριάδας τέσσαρας καὶ ὀκτακισχίλια ὀκτα-
 κόσιαι

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the Son of *Vulcan*, and the *Author* of their *Philosophy*; which he committed (says he) to the *Care of the Priests, and Prophets*; and from whose Time to *Alexander's* were 48,863 Years, during which there had been 373 *Eclipses* of the *Sun*, and 832 of the *Moon*. But *Dicæarchus* above, makes only 436 Years between *Nilus* and the first *Olympiad*. So that if *Nilus* began their *Philosophy*, its Origin amongst them is to be plac'd no higher than 436 Years before the first *Olympiad*, or 1211 Years before the vulgar *Christian Æra*. A Date, even this, I am afraid, much too early, to expect any Thing deserving the Name of *Philosophy*. Thus much, however, we gain from this confused Account, that the Beginnings of it are not so early as the Reign of *Sesonchosis*, or the Time of *Solomon*, if *Sesonchosis* and
Sesac

κόσια ἑξηκοντατρία ἔτη, ἐν οἷς Ἡλίου μὲν ἐκλείψεις
γενέσθαι τριακοσίας ἑβδομηκοντατρεῖς, Σελήνης δὲ
ὀκτακοσίας τριακονταδύο. *Presm.*

Sefac be the same, as Sir *John Marsham* (*b*) thinks they are.

BEFORE the Reign of *Psammetichus*, or the Year before *Christ* 680, the *Egyptians*, according to *Herodotus*, (*i*) thought themselves the first Men. It was from the Time of this Prince only, as he observes, that the *Greeks* had any regular Account of the Affairs of *Egypt*: (*k*) No Wonder then, that the *Egyptians* endeavoured to impose upon them with fictitious Accounts of their more early Ages, and indeed succeeded so well in the Attempt. *Bacchus*, for ought they knew, might be the last of the Gods that reign'd among them; from whose Time to that of *Amasis*, they

C 2

had

(*b*) Pag. 345. i. e. An. Per. Jul. 3696. when, according to him, *Solomon* began his Reign.

(*i*) Οἱ δὲ Αἰγύπτιοι πρὶν μὲν ἢ Ψαμμήτιχου σφίον βασιλεύσαι, ἐνόμιζον ἐωυτὸς πρώτους γενέσθαι πάντων ἀνθρώπων. Pag. 88. Edit. Gronov. 1716.

(*k*) Τὰ περὶ Αἰγύπτου γινόμενα ἀπὸ Ψαμμητίχου βασιλῆος ἀρχάμενοι, πάντα καὶ τὰ ὕστερον ἐπιστάμεθα ἀτερεσίως. Pag. 149.

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had certain Accounts, they told them, of 15,000 Years. (l) *Amasis* began to reign *An. Per. Jul.* 4146, or in the Year before *Christ* 567, according to *Sir John Marsham*; and *Herodotus* was born *Ann. Nabon.* 264. *Per. Jul.* 4230, i. e. eighty-four Years after the Beginning of that Prince's Reign. But when that Historian was in *Egypt*, the Priests could only shew him the Statues of 345 High-Priests, who, they said, regularly succeeded each other, from Father to Son. (m) But this Account, and allowing three Generations to 100 Years, will carry back that Succession only 11,500 Years before the Time of *Herodotus*; which is far short of the 15,000 Years mention'd above.

THIS

(l) Διονύσιω δ' ἐλάχιστα τέτων· καὶ τέτῳ πεντακισχίλια καὶ μύρια λογίζονται εἶναι ἐς Ἀμασιν βασιλέα· Καὶ ταῦτα Αἰγύπτιοι ἀτρεκέως Φασὶ ἐπίσασθαι, αἰεὶ τε λογιζόμενοι, καὶ αἰεὶ ἀπογραφόμενοι τὰ ἔτια· *Pag.* 145.

(m) Ἀρχιερεὺς γὰρ ἕκαστος αὐτοῖσι ἴσεται ἐπὶ τῆς ἐωυτοῦ ζωῆς εἰκόνα ἐωυτοῦ· τὰς πέντε καὶ τισσὶν ἑξαχίλια καὶ τριηκοσίους ἀπέδειξαν κηλοσφύς· *pag.* 144.

THIS is said upon the Supposition of its being true, that these High-Priests were really Father and Son; a Thing much to be question'd by any one that considers the little Probability, that an Office should be continued in one Family, for so many Generations. But, whatever becomes of these extraordinary Successions, and this vast Antiquity, their Observations of the Heavens will fall extreamly short of either. *I have heard, says Simplicius, (n) that the Egyptians have Observations of the Stars wrote down, for no less than 2000 Years, and the Babylonians for more.* This Writer lived under the Emperor Justinian, or about the Year 527 after Christ. If then we reckon 2000 Years back from his Time, we shall have 1473 Years before Christ; which will be 262 Years before Nilus, said above to

(n). "Ημεσας δ' ἐγὼ Ἀιγυπτίους ἀστρων παρατηρήσεις ἔχειν ἐγγεγραμμένους ἢ ἐλάττωσιν ἢ διασχισίαις ἐνιαυτοῖς, Βαβυλωνίους δὲ ἔτι πλείουσιν. *Comment. in Aristot. de Caelo, p. 27. Edit. Ald,*

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to have been the Author of their *Philosophy*.

To attempt the reducing these extravagant Accounts within the Bounds of Probability, may perhaps appear the most extravagant Thing of all: But as here, if any where, Conjecture and Hypothesis are allowable, it may not be improbable, that as the great Design of the *Egyptians* was to impose upon the *Greeks*, they would, in their historical Narrations of Facts, make use of such a Computation, as best answered that Purpose. The Ambiguity of the Word YEAR (o) excellently well promoted their Views; which tho' at that Time usually applied to signify the *apparent annual Revolution* of the Sun, yet originally meant only any *Revolution* in general, and stood particularly for that of the *Moon*. Hence, as *Plutarch* (p) informs

(o) *Heb.* שָׁנָה *Chald.* שָׁנָה from the Verb שָׁנָה which signifies *mutatus, variatus, &c.* and in *Piel mutavit, variavit, &c.* as *Jerem.* 55. and the *Targum* on *Gen.* 41.

(p) *Life of Numa*, pag. 72. Edit. 1620.

forms us, Ἀιγυπτίοις δὲ μηνιαῖος ἦν ὁ ἑκαυτὸς, *The Egyptian Year was a Month.* It is true, indeed, he adds, εἴτα τετράμηνος, ὥς Φασὶ, *Afterwards it consisted of four Months;* and *Censorinus* tells us, Cap. xix. Et in Ægypto, quidem, antiquissimum ferunt Annum bimestrem fuisse; post deinde ab Isone Rege quadrimestrem factum, novissimè Arminon ad tredecim menses & dies quinque perduxisse. (q)

AT what distinct Times these several Changes in the Length of the Year were made, would be an Enquiry not much to our present Purpose: As their Intention was to shew the *Greeks*, what *Children they were* in Comparison of themselves, they would chuse

(q) And thus *Alexander Polyhistor* tells us, that Ἀιγυπτίοι δὲ Θεῶν καὶ ἡμιθέων καὶ παρὰ τήνδε νεκύων καὶ θνητῶν ἐτέρων Βασιλέων πολλὴν καὶ φλύαρον συνείρυσιν μυθολογίαν· οἱ γὰρ παρ' αὐτοῖς ΠΑΛΑΙΟΤΑΤΟΙ σεληναῖος ἑφασκον εἶναι τὴν Τ, ψ μηνιαῖος τὴν ἐνιαυτὸς ἐξ ἡμερῶν λ συνεστῶτας· οἱ δὲ μετὰ τήνδε ἡμίθεοι ὥρως ἑκάλεον τὴν ἐνιαυτὸς τὴν ψ τριμηνιαῖος· *Euseb. Chron. pag. 6. Edit. Amst. 1658.*

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chuse, to be sure, the shortest Form,
which was that of a Month.

IF then we take this along with us, as
our Key, we shall find the Years when
reduc'd;

From <i>Sesonchosis</i> to <i>Nilus</i> ,	208
From <i>Nilus</i> to <i>Alexander</i> the Great,	471
From <i>Nilus</i> to the first <i>Olympiad</i> ,	36

FROM *Sesonchosis*, therefore, to the first
Olympiad are 244 Years; and, if we
make the *Olympiads* begin in the Year be-
fore *Christ* 776, from *Sesonchosis* to the
Beginning of the *Christian* *Æra* will be a-
bout 1020 Years, and agrees very well
with those that suppose him contempora-
ry with *Solomon*. Again, *Nilus*, accord-
ing to this Way of Computation, must
be plac'd about the Year before *Christ*
812. *Babylon* was taken by *Alexander*
about the Year before *Christ* 330; to
which if we add the 471 Years, said here
to

amongst the Antients. 17

to be the Distance of Time between *Nilus* and him, we shall have 801 Years, which is but 11 Years short of the Time just mentioned.

SINCE then we meet with such wild and inconsistent Accounts here, let us try, in the next Place, whether we shall meet with greater Certainty amongst the *Babylonians*. But here we shall soon find ourselves as much at a Loss, and involv'd in the same Obscurity and Contradiction as before. They tell us, that they had a Series of Observations for 473,000 Years backward, (r)

a Period much beyond that of the very

D

Earth's

(r) Contemnamus etiam *Babylonios*, & eos qui, & *Causa* Coeli Signa servantes, Numeris & Motibus Stellarum Cursus persequuntur. Condemnemus, inquam, hos aut Stultitiæ, aut Vanitatis, aut Imprudentiæ, qui cccclxx millia Annorum, ut ipsi dicunt, Monumentis comprehensa continent, & mentiri judicemus, nec Sæculorum reliquorum Judicium, quod de ipsis futurum sit, pertimescere. *Cicero, de Divinat*, p. 50. Edit. *Davis*. Περὶ δὲ τῶν
πληθύν

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Earth's Existence. Much more probable is what *Simplicius* (s) tells us, of Observations, which *Calisthenes* sent to *Aristotle* from thence, and which *Porphry*, says he, informs us were preserved for 1,903 Years before *Alexander's* Time. The Year 1,903, before *Babylon* was taken by *Alexander*, says Sir *John Marsham*, was *Per. Jul.* 2,480, according to which Way of reckoning, the *Babylonians* had Observations for 2,233 Years before *Christ*; a Space of Time vastly short of the

473,000

πλήθος τῶν ἐτῶν ἐν οἷς Φασὶ τὴν Θεωρίαν τῶν κατὰ τὸν κόσμον πεπονῆσθαι τὸ σύστημα τῶν Χαλδαίων, ἐκ αὐτῆς ῥαδίως πιστεύσειεν· ἐτῶν γὰρ ἐπὶ καὶ τετρασάκοντα μυριάδας, καὶ τρεῖς ἐπὶ ταύταις χιλιάδας εἰς τὴν Ἀλεξάνδρου διάβασιν γεγενῆσθαι καταριθμῶσιν, ἀφ' ὅτε τὸ παλαιὸν ἤρξαντο τῶν ἄστρον τὰς παρατηρήσεις ποιεῖσθαι. *Diodor. Sicul. p.* 118.

(s) — Τὰς ὑπὸ Καλλισθένης ἐκ Βαβυλῶνς πεμφθείσας παραληρήσεις ἀφικέσθαι εἰς τὴν Ἑλλάδα, τὸ Ἀριστοτέλης τῷτο ἐπισκῆψαντι αὐτῷ, ἄσθινας διηγῆται ὁ Πορφύριος, χιλίων ἑῶν εἶναι καὶ ἑννεακοσίων τριῶν, μέχρι τὸν χρόνον Ἀλεξάνδρου τῷ Μάρκεδονι σωζομένης. *ut sup. Lib. 2. com. 46. p. 123.*

473,000 Years above; and yet, even this, I am afraid, much too long to deserve any Credit.

EPIGENES, *gravis Autor in primis*, as he is stiled by *Pliny*, (*t*) gives a far more rational Account, when he tells us of *Babylonian* Observations for the Space of 720 Years; though *Berosus* and *Critodemus*, it seems, allow of only 480 Years. *Berosus*, according to Sir *John Marsham*, flourish'd in the 480th Year of *Nabon.* or 56 Years after the Death of *Alexander*. The first Year of *Nabon.* is by Sir *John Marsham* plac'd *Ann. Per. Jul.* 3,967, i. e. the 746th Year before *Christ*: If, then, *Berosus* computed from his own Time, the oldest *Chaldean* Observation will reach no

D 2

higher

(*t*) *Epigenes* apud *Babylonios* 720 Annorum Observationes Siderum, coctilibus Laterculis inscriptas docet, gravis Autor in primis. Qui minimum *Berosus* & *Critodemus* 480 Annorum. *Nat. Hist. L. 7. c. 56.* A Fragment of one of these Tiles is said by *Gassendus*, to have been sent to *Peireskius*, about the Year 1628. See his *Life*, p. 320.

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higher than the 746th Year before *Cbrist*. What Time *Epigenes* lived in is uncertain; *Sin Temporibus Augusti scripserit*, says Sir *John Marsham*, *bene convenit illi cum Berofo; nam Ann. Nabon. 720, est Annus Augustorum secundus*. And that their Observations did not go much higher than this, has all the Evidence that can be expected, in so intricate a Subject, at this Distance of Time, and where there is such Want of Memoirs to direct us. It agrees very well with the natural Progress of Science, and seems abundantly confirmed from the Inaccuracy, with which the oldest *Eclipses* are set down in *Ptolemy*; (u) the earliest of which fell out but in the Year before *Cbrist* 721.

BUT

(u) Ὡν τοίνυν εἰλήφαμεν παλαιῶν τριῶν Ἑκλείψεων ἐκ τῶν ἐν Βαβυλῶνι τετηρημένων, ἡ μὲν πρώτη ἀναγέγραπται γεγονῶσα τῷ πρώτῳ ἔτει Μαρδοκემπάδου, κατ' Αἰγυπτίους Θωθ καὶ εἰς τὴν λ. *Ptol. Syntax.* p. 95. *Edit. Basil.* 1538. These Eclipses are thus more accurately set down in *Street's Astron. Carolin.* p. 98.

amongst the Antients. 21

BUT here, when we speak of *Eclipses*,

Years before Christ.	Equal Time at London.	True Place of the Sun.	Difference of the Sun from Ω .	Mean Ano- maly of J	Moon in her Orbit comp.	Diff. from Ober.	Dig. Ober.	Deg. and Minutes comp.
	M. D. H. /	S. / o. "	S. o. / " "	S. o. / " "	S. o. / " "	/ " "		
721	Mar. 19 6	24 21 48	41 6 1 28	39 2 3 47	42 21 35 24	12 57	Total.	18 45
720	Mar. 8 8	57 36 10 54	19 6 9 19	24 9 10 11	20 11 3 23	11 93	A	1 20
720	Sep. 1 5	45 22 1 16	27 0 9 3	30 5 10 56	59 36 0 46 14	28 11 6	p. B	5 15

22 *The Rise of Astronomy*

as set down by the *Chaldeans*, we must not imagine, that they were any Thing more than bare *Registers* of what had been observed. That the *Theory* of the *Moon's Motions* was at all known so early as this, or that the *Chaldeans* were ever capable of *calculating* and *predicting* an *Eclipse*, is more than can be made appear from any good Authority now extant. (x) Diligent Observers of the Heavens, no Doubt, they were, and carefully mark'd every Phenomenon that could come to their Knowledge: This appears by their Embassy to *Hezekiah*, one Part of which was to enquire, concerning *the Sign that was done in the Land*: (y) But every one sees the

(x) *Diodorus Siculus* expressly asserts they could not, Περὶ δὲ τῆς κατὰ τὸν ἥλιον ἐκλείψεως ἀσθενεστάτας ἀποδείξεις φέροντες, ἢ τολμῶσι προλέγειν ἢ ἀκριβῶς ὑπὲρ αὐτῆς παραγράφειν τὰς χρόνους, pag. 117.

(y) *Isaiab* 39. 1. 2 *Kings* 20; 12. *Chron.* 32, 31. This Writer, *Isaiab*, is the oldest Author now extant, that mentions any Thing of the *Chaldeans* observ-

the wide Difference between this, and a Science built upon strict demonstrative Principles. For the same Reasons we may believe *Apollonius Myndius* in *Seneca*, (z) when he informs us, that they had observed Comets, and reckon'd them in the Number of *Stars* that
changed

observing the Heavens, *ch. 47. 13.* He speaks of their
 חֲבֵרֵי שָׁמַיִם הַחֹזִים בְּכֹכְבִּים מוֹדִיעִים לְחֻדָּשִׁים
Those that were constantly prying into the Heavens; the Star-gazers, and those that taught to understand concerning Months; or, perhaps, as the last Words may be rendred, that foretold future Events. And ch. 13. 10. he seems to speak of particular Stars, called by them כְּסִילִים, and which are mentioned likewise in Amos, and in the Book of Job: But these shall be distinctly considered by themselves.

(z) Duo certe qui apud *Chaldæos* studuisse se dicunt, *Epigenes*, & *Apollonius Myndius*, peritissimus inspiciendorum naturalium, inter se dissident. Hic, enim, ait *Cometas* in numero *Stellarum errantium* poni a *Chaldæis*, tenerique *Cursus* eorum. *Epigenes* contra ait, *Chaldæos* nihil de *Cometis* habere comprehensi, sed videri illos accendi *Turbine* quodam æris concitati & intorti. *Nat. Quæst. L. 7. 8. 3.* Neither, as it is certain, were they better understood amongst the *Egyptians*. *Democritus* quoque (says *Seneca*) subtilissimus antiquorum omnium,
 suspicari

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changed their Place. But that they knew their Courses, as he says they did, or were able to predict their Appearance, as *Diodorus Siculus* (a) affirms, is no Way probable: Though favoured with an open Country, and a clear Sky, and constantly prying into the Heavens, they could not let them escape without Notice; their
Num-

suspiciari ait se, plures stellas esse *quæ currant*; sed nec Numerum illarum posuit, nec Nomina, *nondum* comprehensis quinque Siderum Cursibus. *Eudoxus* primus ab *Ægypto* hos Motus in *Græciam* transtulit. Hic tamen de *Cometis* nihil dicit: Ex quo apparet *ne apud Ægyptios quidem*, quibus major Cœli Cura fuit, hanc partem elaboratam. *Conon* postea, diligens & ipse inquisitor, defectiones quidem solis servatas ab *Ægyptiis* collegit, nullam autem mentionem fecit *Cometarum*, non prætermisurus, si quid *explorati apud illos* comperisset. *ut sup.* *Conon* lived under *Ptolemy Everget.* about the Year before *Christ* 230, and was the Framer of the Constellation, called *Coma Berenices*. See *Callimach. Epigr.* and *Catull. carm.* 64.

(a) Ἐστὶ δὲ ὅτε Κομήτων ἀστέρων ἐπιτολὰς, ἔτι δὲ ἡλίῳ τὶ καὶ σελήνῃς ἐκλείψεις καὶ σεισμὸς, καὶ τὸ σύνολον πάσας τὰς ἐκ τῷ περιέχοντι[⊙] γενομένας περιστάσεις, ὠφελίμους τὶ καὶ βλαβεράς ἢ μόνον ἔθνεσι καὶ τόποις, ἀλλὰ καὶ βασιλεῦσι καὶ τοῖς τυχεῦσιν ἰδιώταις. P. 116. Edit. *Rhodomann.* 1604.

Number, perhaps, being greater, or the Periods of some of them shorter than is suspected. Be that, however, as it will; from the accurate Labours of Dr. *Halley* (b) it appears, that the Comet of 1456 has a Period of about 151 Years; that of 1682 of 75 Years; and that of 1680-1, the most remarkable of all, one of 575 Years. This last, as seems highly probable, appeared in the 44th Year before *Christ*, or *Ann. Per. Jul.* 4669; from which, reckoning 575 Years back, that Comet will be found to have appeared, *Ann. Per. Jul.* 4094, the 1st Year of the 39th Olympiad, *Ann. Nabon.* 127, and 619 before *Christ*, within the Time that we are certain they observed the *Heavens*. Since, however, nothing is come down to us from them, relating to so remarkable an Appearance, there is but too fair Ground to suspect, that they

E

look'd

(b) See *Whiston's Mathematical Philosophy*, at the End; and at the End of *Scarburgh's Euclid*, printed at Oxford, 1705.

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look'd upon them only as Meteors and sudden Exhalations, as *Epigenes* (c) says they really did.

THE Result of what has been here laid together, then, is this : The most probable Method of reconciling those amazing Accounts of so many thousand Years, is, either by supposing, as before, that the Years they computed by were

(c) See above, Note (z). And so the *Greeks*, though they were divided in their Opinions about them. Τὸς δὲ κομήτας καὶ τὸς τοιούτους, οἱ μὲν λέγουσιν ἐξ αἰθέρων συνερχομένων γίνεσθαι, καὶ ἐμφωτισμένων· οἱ δὲ ἐκ νεφῶν περιπεφωτισμένων· ἄλλοι δὲ ἐκ παρατρίψεως αὐτὸς φωτίζεσθαι. λέγουσιν· καὶ φαίνονται δὲ αἰεὶ· ἀλλὰ γίνονται κατὰ περιόδους χρόνων. *Achilles Tatius*. pag. 159. His own Opinion was, that εἰσὶ δὲ καὶ ἐν ἡραν καὶ ἄλλ' ἐν τῷ αἰέρι. *ibid*. pag. 158. This was the Opinion of several Philosophers, as may be seen in *Plutarch*. *Diogenes* thought αἰέρας εἶναι τὴν Κομήταν. Others indeed were of different Opinions about them ; Τῶν ἀπὸ Πυθαγόρου τινὲς μὲν αἰέρας φασὶν εἶναι τὸν Κομήτην, τῶν καὶ αἰεὶ φαινομένων, διὰ τίνος δὲ ὤρισμένου χρόνου περιοδικῶς ἀνατελλόντων. *Plutarch. de Plat. Philof.* L. 3. c. 2. Some think, that Comets were meant by *Homer*, *Iliad* 4. *vers.* 75. where he says :

Οἶον

were only *Lunar Years*, of a Month each; or that they wilfully or ignorantly made them equivalent to *Kings Reigns*. This, before *Egypt* came to be united under one Monarch, and while every little District had its Prince, would be a very variable and precarious Way of reckoning, on Account of their frequent Contests and Revolutions. By this Means, several Kings might reign in one and the same Province, within the Compass of a Year; which, upon this Supposition, will swell their Annals, as we find it has done, beyond all the Bounds of Probability.

E 2

THE

Οἶον δ' Ἀσέρα ἦκε Κρόνῳ παῖς ἀγκυλομήτεω,
 Ἡ ναύτησι τέρας, ἢε στρατῷ εὐρέϊ λαῶν,
 Λαμπρόν, τῷδε τε πολλοὶ ἀπὸ σπινθήρες ἵενται
 Τῷ εἰκὺ ἦϊξεν ἐπὶ χθόνα Παλλὰς Ἀθήνη.

Ἀσέρα δὲ νῦν, says *Eustathius* there: ὃ τὸν κυρίως λέγει, ἀλλὰ τὶ Ἀσροειδὲς, οἶον Κομήτην ἢ σκηπτὴν εἶδος.

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THE first Time that we hear of Egypt considerable enough to attempt a foreign Invasion, was in the Reign of Rehoboam, the Son of Solomon, when Jerusalem was taken by Sefac. (a) It was in the Reign of

(a) 1 Kings 14. 25. This Sefac, or Sesostris, was the first Person that made Use of long Ships, according to the Egyptians own Account. Τὸν ἔτεγον δὲ Ἰβίης πρῶτον πλὴν πλοίοισι μακροῖσι δρυμνήεντα ἐκ τῆς Ἀραβίης κόλπον, τὰς παρὰ τὴν Ἐρυθρὴν θάλασσαν καλοῦσιν, καταστρέφειν. Herodot. pag. 125. I don't know upon what Authority Lucan says,

Venit ad Occasum mundique extrema Sesostris.

Pharf. Lib. 10.

but it is certain that the Eastern Sea along the Cinnamon Coast, and not the Western African Coast, towards the Island of Madagascar and the Cape of Good Hope, was called by the Antients the Erythraean Sea. Thus Dionys. Perieget. speaking of Taprobane, says,

— ἀμφὶ δὲ πάντῃ

Ἰήτες θῖνες ἔχουσιν, Ἐρυθραίου βοτὰ πάντα.

vers. 597.

That

of Solomon that we first hear of *Shipping*, and a long *Voyage*: (f) from hence one may probably suspect, that some very rude Observations (g) had been made of the Risings and Settings of some Stars, during the foremention'd Period; and which, to any one that duly attends to it,

That the *Phenicians* sailed *Eastward* is likewise certain, from *Eustath. on Dionys. Perieget. vers. 609.* ἄλλοι δὲ φάσιν (says he) ὅτι ὁ Περσικὸς κόλπος μικρὸν τι ἐλάττω Ἐυξείνῃ ἐστίν, ἐν ᾧ Ἰκαρὸς τε νῆσος, καὶ Τύρος, καὶ Ἀραβία, ὁμῶνυμοι ταῖς Φοινικαῖς. On the contrary, we hear nothing of any Settlements that they had the other Way.

(f) 1 Kings 9. 25. It is true, indeed, we find *Ships* mentioned before, as *Judges* 5. 17. but these, I suppose, were only *Coasters*, or small *Fishing-boats*.

(g) Such as those that are said to have been mark'd on the Tomb of *Osymanduas* at *Thebes*, where as *Diodorus Siculus* informs us, pag. 46. Edit. 1604. ἦν (ἀνάβασιν) διελθῶσιν ὑπάρχειν ἐπὶ τῷ Μνηματίῳ κύκλου χρυσῶν τριακοσίων καὶ ἐξήκοντα καὶ πέντε πηχῶν τὴν περίμετρον, τὸ δὲ πᾶχος πηχυαῖον ἐπιγεγραῖφθαι δὲ, καὶ διηγεῖσθαι καθ' ἑκάστον πῆχυν ταῖς ἡμέραις τῷ ἐν αὐτῷ, παραγεγραμμένων τῶν κατὰ φύσιν γινομένων τοῖς ἄστροις ἀνατολῶν τε καὶ δύσεων, καὶ τῶν διὰ ταύτας ἐπιτελεσμένων ἐπισημαστίων κατὰ τῆς Αἰγυπτίας Ἀσρολόγους. See Dr. Pocock's *Travels into Egypt*, pag. 109.

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it, must appear to have been owing to the Diligence of several Years. That *Sirius*, for Example, rose *Heliacally* at one Season, and the Stars that we now call the *Pleiades* at another: That the former was attended with great *Heats*, and the latter with *Rains*, were Observations that were not made all at once; though, undoubtedly, look'd upon in those Days, as very extraordinary Marks of Science.

OTHER Things, that we may suppose would be pretty soon remark'd, are the Inequality of Days, the Diversity of Seasons, and the *Phases* of the Moon. Between the Time that this Luminary first appeared in the *Evening*, as she came out of the Sun-Beams in one Luration, and the same Time again in the next, they supposed, from such rude Observations as they were then able to make, was contained the Space of
Thirty

Thirty Days. Twelve of these, (*b*) they found, nearly answered the Time that the Sun took up, from his leaving any Star 'till his Return to it again; or from that Star's rising *Heliacally* one Year, 'till its doing so the next. Hence arose the *Luni-solar* Year of 360 Days, and was the first Sort of Year accommodated to the Motion of the Sun, of which the *Egyptians* may be supposed to have been the Authors.

It is true, indeed, this Sort of Year was found by Degrees to be too short,
and

(*b*) This, I suppose, gave Occasion to the Division of the *Day* into *twelve* Parts, rather than any other Number; and so likewise of the *Ecliptick*. The *Chaldeans*, however, (it seems) divided this last into Eleven Signs only, making *Libra* a Part of *Scorpio*; differing in this Respect from the *Egyptians*, as we are inform'd by *Servius on Virg. Georg. 1. v. 33*. How, and by what Method the *Egyptians* divided the *Ecliptick* into 12 Parts, may be seen in *Macrob. in Somn. Scip. L. 1. c. 21*. and in *Theon's Comment on Ptolemy's Syntax*, pag. 261. *Ptolemy* rejects the Method intirely, as precarious; and *Hipparchus*, according to *Theon*, (*as above*) allows it only in a *Right Sphere*, i. e. for those that live under the *Equator*.

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and therefore they added five Days at the End of the Year, which now consisted of 365 Days. (i)

To make this the more apparent, let it be consider'd, that as we have no Reason to imagine there was hitherto any Theory of the heavenly Motions, all must have been done by bare Observation. Let the *Star* so observed be *Sirius*, which seems to have been the best adapted for the Purpose, being one of the first Magnitude, and as early as any taken Notice of by the *Egyptians*. (k)

Let

(i) Πρώτους Ἀιγυπτίους ἀνθρώπων ἀπάντων ἔξευ-
ρίειν τὸν ἐνιαυτὸν δώδεκα μέρεα δασαμένους τῶν
ῥέων ἐξ αὐτὸν· ταῦτα δὲ ἔξευρίειν ἐκ τῶν ἄστρον
ἔλθον· ἄγνοι δὲ τοσῶδ' ἀσφατέραν Ἑλλήνων, ἱμοὶ
δοκίμην, ὅσω Ἑλλήνας μὲν διὰ τρίτου ἔτεος ἰμβόλι-
μον ἐπιμβάλλουσι τῶν ῥέων ἵνεκεν· Ἀιγύπτιοι δὲ
τριηκοντημέρους ἄγοντες τὰς δώδεκα μῆνας, ἐπάγουσι
ἀνὰ πᾶν ἔτος πᾶν ἡμέρας πάρεξ τῷ ἀριθμῷ ἢ
σφι ὁ κύκλος τῶν ῥέων ἐς τῶντ' ἀριθμῶν, παρα-
γίνεται· *Herodot. pag. 89.*

(k) The *Egyptians* began the Year from the Ri-
sing of this *Star*. Πρὸς γὰρ τῷ καρκύνῳ ἡ Σῦθις
αἵ

amongst the Antients. 33

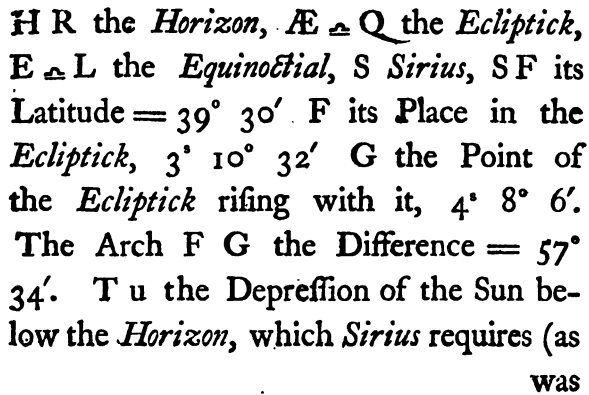
Let us suppose, farther, the Place of Observation to be *Heliopolis*, (1) which lay in about 30° North Latitude. A Star of the first Magnitude, according to *Ptolemy*, (m) appears as soon as it comes to be 12° distant from the Sun. The Place of *Sirius* in the Year 1743 was $\approx 10^{\circ} 32'$ and a few Seconds. Its Latitude $39^{\circ} 30'$. Hence its Declination will be found to be $16^{\circ} 19' 48''$. Its Right Ascension $98^{\circ} 27' 9''$. The Ascensional Difference $9^{\circ} 43' 9''$. The oblique Ascension $108^{\circ} 10' 18''$; and the Point of the *Ecliptick* rising

ἦν Κυνὸς ἀστέρα "Ελληνες φασί. Νεμνηία δ' αὐτοῖς
 η Σώθεις ἀνατολή. *Porph. de Antro Nymph.* pag.
 265.

(1) Ὅι γὰρ Ἡλιεπολίται λέγονται Ἀιγυπτίως
 εἶναι λογιώτατοι. *Herodot. ut sup.*

(m) *Syntaxis*, pag. 207.

rising with it $128^{\circ} 6'$, or $4^{\circ} 8^{\circ} 6'$ In
the Scheme then annex'd there is,



amongst the Antients. 35

was said) to be 12° . In the Right Angled Triangle, then, S F G there is given S F = $39^\circ 30'$ and F G = $57^\circ 34'$. To find the Angle S G F. Then

$$\begin{array}{r} \text{Rad. } \dagger \text{ Tang. } 39^\circ 30' \quad 19,916104 \\ - \text{Sin. } 57^\circ 34' \quad 9,926351 \\ \hline \text{Tang. } 44^\circ 19' 32'' \quad 9,989753 = \text{S G F} \end{array}$$

In the Triangle T G u Right angled at T there is given the Angle T G u = S G F = $44^\circ 19' 32''$ and the Side T u 12° to find G u.

$$\begin{array}{r} \text{Rad. } \dagger \text{ Sin. } 12^\circ \quad 19,317879 \\ - \text{Sin. } 44^\circ 19' 32'' \quad 9,844243 \\ \hline \text{Sin. } 17^\circ 18' 10'' \quad 9,473636 \end{array}$$

$$\begin{array}{r} \text{The Point of the Eclip-} \\ \text{tick ascending} \quad \left. \begin{array}{l} \\ \text{G u} \end{array} \right\} \begin{array}{r} 4^\circ \quad 8' \quad 6'' \\ 0 \quad 17 \quad 18 \quad 10 \\ \hline 4^\circ \quad 25' \quad 24'' \quad 10'' \end{array} \end{array}$$

F 2 SIRIUS,

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SIRIUS, therefore, rises *Heliacally*, when the Sun is in $25^{\circ} 24' 10''$ of α , which was in the Year 1743, *Aug. 8*. Should, then, *Sirius* rise *Heliacally* the next Year 1744, *Aug. 8*, and the Observation be made with great Exactness, the Quantity of the Sidereal Year would be given proportionably just. But since this is more than can be expected in Cases of this Nature, especially in the Infancy of Science, we cannot be surprized, that at first the Year fell short of the Truth, by a Day perhaps, or even more.

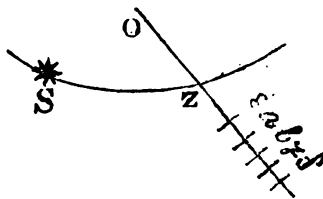
SINCE this, however, was the Method by which, in all Probability, they corrected the old *Lunisolar* Year of 360 Days, we may suppose they continued with great Industry to observe, for some Years, the *Rising* of this Star. It was by this Means, at last, they discover'd, that the Length of the Solar Year consisted of 365 Days and $\frac{1}{4}$. At what Time this was first

first determin'd, is hard to say; but, probably, not much before the Time of *Eudoxus*, or the Year before *Christ* 363: For in his Time *first* it was, that the *Greeks* became acquainted with it, as *Strabo* (n) seems to insinuate, *having 'till then, he says, been utterly ignorant of it.* For by long Observation of that Star, (and by long Observation only it could be) they found it went back, or rose later every Year, by *Six Hours.* (o)

By

(n) Οὔτοι (the *Egyptians*) τὰ ἐπίτρεχοντα τῆς ἡμέρας καὶ τῆς νυκτὸς μετὰ ταῖς τριακοσίαις ἐξήκοντα πέντε ἡμέραις εἰς τὴν ἐκπλήρωσιν τοῦ ἐνιαυσίου χρόνου ἀλλ' ἠγνοεῖτο τέως ὁ ἐνιαυτὸς παρὰ τοῖς Ἕλλησι. *Pag.* 806.

(o) This is explained in *Bainbrige's Canicularia*, *pag.* 28. thus. Let S Z be an Arch of the *Horizon*, O Z an Arch of the *Ecliptick*, and S *Sirius* upon the *Horizon*. Let the Sun be rising at the same Time in Z, and therefore with his Light obscuring the Star at S. That any Star may



be

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By this Means, in the Compass of four Years, it went back one whole Day; and in 365 Times four Years, or 1460 Years,

365

be visible, it is requisite that the Sun should be some certain Number of Degrees below the *Horizon*, here numbered in the *Ecliptick*. Suppose that Place to be α , so that when the Sun is in α , or lower, reckoning according to the Order of the Signs, the Star rising at S will be visible; but if he is any where between Z and α , it will not be so. Take then, towards Z, the Portion $\epsilon \alpha$ equal to $\frac{1}{4}$ of a Degree; and on the other Side $\alpha \beta = \beta \gamma = \gamma \delta = \epsilon \alpha$. The Motion of the Sun for $\frac{1}{4}$ of a Degree, answers nearly to Six Hours in Time, and is nearly the Excess of the *Tropical Year* above 365 Days.

Suppose, then, that the first Year, on the first Day of the *Egyptian Month Thoth*, *Sirius* at S is rising and visible when the Sun is in δ ; the 2d Year, on the same Day of *Thoth*, the Star will rise when the Sun is at γ ; the 3d Year, when he is at β ; and the 4th Year, still on the same Day of *Thoth*, when he is at α . For at the End of every *Egyptian Year* of 365 Days, there was wanting to compleat the *Tropical Year* the 4th Part of a Day, and to finish the Sun's Course, the 4th Part of a Degree.

During these first four Years, then, when the Sun is in δ , γ , β , α , the Star rising at S will be seen on the first Day of *Thoth*. But in the 5th Year, on the first Day of *Thoth*, the Sun will be in ϵ , and
the

365 Days, or a Year. *Sirius*, therefore, would not rise *Heliacally* on the same Day it did the Year before, 'till 1461 Years after.

THIS Period of 1460 Years is called the *Sothiacal* Period, and takes its Beginning from the Time that *Sirius* rose *Heliacally*, the first Day of the *Egyptian Thoth*, or the *Roman September*. (p) By considering then that we before determined the *Heliacal* Rising of *Sirius*, the Year 1743, at *Heliopolis*, to be Aug. 8, we shall find that, to the 21st of September exclusively, are wanting 23 Days; which

the Star rising at S will not be seen, but on the 2d Day of *Thoth* the Sun will be in δ , and the Star rising at S will be seen. In the 6th Year, on the same 2d Day of *Thoth*, the Sun will be in γ ; the 7th Year in β ; and the 8th Year in α . During, then, these second four Years this Star will rise *Heliacally* on the second Day of *Thoth*. And after the same Manner, during the next four Years, on the third Day; and for the next four Years, on the fourth Day of *Thoth*; and so on.

(p) Sir John Marsham.

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which multiplied by 4 gives 92 Years to the Conclusion of this Period. But $1460 - 92 = 1368$, the present Year of this Period; and which subducted from the Year 1743 gives 375, the Year of *Christ* when this Period began; and by subducting yet farther 1460, we shall have the Year before *Christ* 1085, when this Period commenc'd before.

NOT that we are necessarily led from hence, to suppose this Period was settled so early as this, or that the Quantity of the *Sidereal* Year was known to such a Degree of Exactness at that Time: For had this been really the Case, we can hardly suppose that *Thales* and *Solon*, so many Ages after, would have been so unacquainted with the Invention, as we shall find they actually were.

BUT, whenever the *Egyptians* became acquainted with these six odd Hours, necessary to compleat the Year, they

amongst the Antients. 41

they seem, if *Geminus* may be credited, to have serv'd only for Speculation ; or at most, were admitted no farther than in civil Concerns. For, by I know not what Kind of Superstition, (q) they chose rather, by rejecting them, to let their Feasts rove through all the Days of the Year, than by admitting this Correction, to bring them nearer to a Certainty. Hence it was that, in the Time of *Eudoxus*, the Feast of *Iſis* fell upon the Winter *Tropic*, (r) though it is plac'd by *Achilles*

G

Tatius

(q) Βάλλουσαι γὰρ τὰς θυσίας τοῖς θεοῖς μὴ κατὰ τὸν αὐτὸν καιρὸν τῷ ἐνιαυτῷ γίνεσθαι· ἀλλὰ διὰ πασῶν τῶν τῷ ἐνιαυτῷ ὥρῶν διελθεῖν. *Geminus apud Petav. Uranolog. pag. 33.* And this unavoidably happened, for the Reason he presently after assigns ; Ἄγῃσι γὰρ τὸν ἐνιαυτὸν ἡμερῶν τριακοσίῳ ἐξήκοντι πέντε· δώδεκα γὰρ μῆνας ἄγῃσι τριακονθημέρας, καὶ πέντε ἡμέρας ἐπάγῃσι. τὸ δὲ ἔστι ἐπάγῃσι.

(r) Ὑπολαμβάνουσι γὰρ οἱ ἀπείροισι τῶν Ἑλλήνων ἅμα τοῖς Ἰσίοις κατ' Αἰγυπτίους, καὶ κατ' Εὐδόξον εἶναι χειμερινὰς τροπὰς· ὅπερ ἐστὶ παντάπασιν ψεῦδος, &c. *Geminus ibid.*

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Tatius (*s*) in the Summer one; and where, if his Account of that Solemnity be true, perhaps, it was originally fix'd. When that was, is uncertain; but it is evident, that in *Eudoxus's* Time it had changed its Place from *Tropic* to *Tropic*, that is, differ'd from the Day where it was first settled, by about 182 Days; for Accuracy in an Enquiry of this Nature cannot be expected. Since, then, in 1640 Years, this Feast would move through the whole 365 Days, 182 Days must correspond to about 817 Years. In the Year before *Christ* 363, when *Eudoxus* flourished, the apparent Time of the Winter *Solstice* was, at *London*, December 24th, 23^h 37' 42"; or, December

(*s*) Ποτὲ δὲ Ἀιγύπτιοι ἀπὸ Καρκίνου ἐπὶ αἰγιοκέρωτα τὸν ἥλιον κατιόντα ὁρῶντες, καὶ ἐκ μακροτέρων σμικρύνοντα τὰς ἡμέρας, ἐπέπνυν, εὐλαβούμενοι μὴ καταβραχὺ καταλίπη αὐτὸς ὁ ἥλιος· καὶ εἶναι ὁ καιρὸς ἕτος ὁ παρ' αὐτοῖς τῶν καλυμένων Ἰσίων· ἐπεὶ δὲ πάλιν ἀναβαίνειν ἤρξατο, καὶ μακροτέρας ποιεῖν τὰς ἡμέρας δὲ τηνικαῦτα λευχειμονήσαντες ἐγεφανερόρησαν· *Achill. Tat. ibid. pag. 146.*

ember 25th, 37' 42", past Eleven of the Clock in the Morning, according to the vulgar Reckoning; So that the Feast of *Isis* was that Year celebrated in *Egypt*, about *December* 25th; and 817 Years before that, or about the Year before *Christ* 1180, this Feast, *if so early*, was kept about *June* 27th. I said *if so early*, because there is no History old enough extant, to ascertain the Truth of it; and a Mistake in the *Egyptians*, or in *Eudoxus*, or both, in Relation to the Times of the *Solstice*, (a Thing by no Means hard to conceive) will bring down the Institution proportionably lower.

WHETHER this Feast was kept upon an *Astronomical* Account, or any other, is hard to say; but from a Similarity of Rites one would guess it to be the same with a Feast kept in Honour of *Tammuz*, and from whom the Month of *June*, amongst the *Syrians*, derived its Name. The earliest Mention that we

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find made of *Tammuz* is in *Ezekiel* (*t*), where we read of *Women* מְבָכּוֹת אֶת חַתְמוֹ *weeping for Tammuz*, as a Species of

(*t*) Chap. 8. 14. Who *Tammuz* was, and what was the Reason of weeping at his Festival, is very uncertain. *R. Tanchum* has a very large Explanation of this Passage in *Ezekiel*, which, because not hitherto in Print, I shall transcribe: תָּמוּז אִסָּם לְצִנָּם

מֵאָה כָּאֵן הָיָא סְבִיל עֲבָדְתָּהּ אֵן יִגְתַּמְעוּן
אֶלְנִסְוֹאן חוּלָה לְלִבָּכָא וְקִד חֲכִי ר' מִשָּׁה זִל
פִּי כְתָאב דְּלֵאל אֶלְחֵאִירִין מַח וְגֵדָה פִּי
כְתָב אֶלְצָאבָה מִן כְּבֵדָה וְסִבָּב בְּכֵאֲהֵם
וְנִרְבָּהֵם עֲלֵיהּ בְּזִמְעָהֶם וְעֲלֵי הָדָא יִכּוֹן
מְבָכּוֹת גִּיר מִתְעַדִּי מִתַּל רַחֵל מְבָכָה עַל
בְּנִיָּה אֶלְדִּי הוּא מִתַּל בּוֹכָה וְקִיל אָנָּה צִנָּם
כָּאֵן מַעֲמוּל בְּצִנְאָעָהּ וְחִילָהּ יַחְתָּאֵל בְּהָא
אָנָּה אִדָּא חֲצֵר עֲנֵדָה אַחַד וְאַשְׁתַּכָּא אֶלְמָה
וְחֵאלָה סָהֵר לָהּ בְּתַלְךְ אֶלְחִילָה אָנָּה יִבְכִּי
וְאַלְנִסְוֹאן פָּהֶם אֶכְתֵּר מִילָא לְהֵדָה אֶלְאִמּוֹר
אֶלּוּהִמִּיָּהּ וְאַכְתֵּר אֶלְאָם וְאַחֲזָאן מִן אֶלְרָגֵל
פִּלְדִּלְךְ נִסָּב אֶלְפַּעַל לָהּ וְעֲלֵי הָדָא יִכּוֹן
מְבָכּוֹת מִתְעַדִּיא אִי אָנָּהֶן יִסְבְּבִין לָהּ אֶלְבָּכָא
בְּמָא יִשְׁכּוֹן אֶלִּיהּ וְיִנְדַּבּוּן עֲנֵדָה וְחִרְף אֶת
לְתַעֲדִי וְאַמָּא עֲלֵי אֶלְקוּל פָּהוּ בְּמַעֲנֵי
עַל מִתַּל וְכִפֵּר אֶת מִקְדָּשׁ הַקֹּדֶשׁ וְנִחְוָה:

Tammuz is the Name of an Idol. One Method of Interpretation is, that Women gathered round it to weep.

of foreign Superstition crept in among the Jews, in his Time. How long they had been infected with it, is uncertain; but

we weep. *R. Moses (i. e. Maimonides) tells us in his Book called the Guide of the Doubtful, what he found in the Books of the Zabeans concerning it, and the Reason why mournful Songs were sung over it. According to this Explanation, the Word מנכה may be an Intransitive, as where it is said Rachael מנכה weeping for her Children, Jerem. 31. 15. in which Case it signifies the same as the Participle בוכה. Some say it was an Idol, formed with Art and Contrivance, so that when any one stood by it, and complained of the Sorrow and Distress he was in, it would seem to weep. Women are most inclined to these imaginary Things, and more subject to Grief and Sorrow than Men; and therefore the Prophet attributes this Action to them. Taking this to be the Case, the Word מנכות may be a Transitive; as if by their Complaints, and mournful Songs, they made it to weep. The Particle את denotes a transitive Signification, in the same Manner, as where it is said, וכפר את מקדש הקדש Levit. 16. 33. Maimonides, as above quoted, Part 3. c. 29. says, that he was a false Prophet, and invited the King (but what King he doth not say) to the Worship of the seven Planets, and the twelve Signs of the Zodiack; and that he was cruelly put to Death by him. What Day of the Month this Feast*

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we find in *Manasseh's* Reign (*u*) the stellary Worship had gained some Footing amongst them. It is the same Feast, perhaps, that was celebrated long afterwards both in *Egypt*, (*x*) and *Greece*, (*y*) and called the Feast of *Adonis*; in both those

was kept is not agreed on; *Maimonides*, as above, says it was on the *first*, but others in the Middle:
 فِي نَصْفِ مَهِّ عِيدِ الْيَاكِبَاتِ بِعَنِي النِّسَاءِ الْمُبْكِيَّاتِ
 عِيدٌ يَجْعَلُ تَامُوزَ الْإِلَهِ وَيَبْكِي النِّسَاءُ عَلَيْهِ كَيْفَ
 قَتَلَهُ رَبُّهُ وَطَعَنَ عِظَامَهُ فِي الرَّحَا ثُمَّ ذَرَاهَا
 In the Middle of it is the Feast of Weepers, or of Women that wept. It was a Feast instituted in Honour of the God Tammuz; when Women wept for him, because his Lord killed him, and ground his Bones in a Mill, and then scattered them in the Wind. See *Gol. Not. ad Alfragan*, pag. 18.

(*u*) II. Kings 21. 3. 5. and II. Chron. 33. 3. 5.

(*x*) See *Theocrit. Idyll.* 15th, the Scene of which is laid at *Alexandria*.

(*y*) Perhaps *Bion's Idyll.* 'Αἰάζει τὸν Ἀδωνιν ἀπώλετο καλὸς Ἀδωνις, was composed for the same Solemnity in *Greece*. We find in *Pausanias* Mention made of a little Chappel, where τὸν Ἀδωνιν αἱ γυναῖκες Ἀργείων ὀδύρουσαι, pag. 62. *Plutarch*, in his Life of *Nicias*, gives a little more circumstantial Account of this Festival in *Greece*, where he tells us, that

those Countries celebrated with the same melancholy Ceremonial of Tears.

.. THAT *Thammuz*, *Adonis*, *Osiris*, and *Apollo*, are all of them Names for the *Sun*, will not seem quite improbable, to any one that considers it. אֲדֹנִי *Adonis* might be the *Phœnician* Name of this Planet, as בַּל Baal or Belus, the *Babylonian*; or, according to the *Chaldean* Pronunciation, פִּל Pil, or פִּל Pul, as may be yet seen in the Words *Pul* and *Nabopolassar*,

that Ἀδωνεία γὰρ εἶχον αἱ γυναῖκες τότε, καὶ προῦκειτο πολλαχόσε τῆς πόλεως Ἰδῶλα, καὶ ταφῆς περὶ αὐτὰ καὶ κοπετοὶ γυναικῶν ἦσαν. And in his Life of *Alcibiades*, to the same Purpose, he says, Ἀδωνίω γὰρ εἰς τὰς ἡμέρας ἐκείνας καθιόντων, ἰδῶλα πολλαχῶ νεκροῖς ἐκκομιζομένοις ὁμοίᾳ προῦκειτο ταῖς γυναιξὶ, καὶ ταφῆς ἐμιμνήσκειν καὶ κοπιόμεναι, καὶ θρήνους ἤδον. From *Pausanias*, pag. 294. *Adonis*, at least in his Opinion, seems to have been a real Person, and later than the Time of *Cadmus*. Τὸν δὲ Ἀδωνιν (says *Plutarch*) οὐκ ἕτερον, ἀλλὰ Διόνυσον εἶναι νομίζουσι, καὶ πολλὰ τῶν τελευμένων ἐκατέρω περὶ τὰς ἑορτὰς βεβαῖοι τὸν λόγον. οἱ δὲ παιδικὰ τῷ Διονύσῳ γεγενῆσθαι. *Sympos. Lib. 4. Quæst. 5.*

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polassar, and the like. Hence אב-פול *Ab-Pul*, or, as one would say, *Lord, Father*, which softened in the *Greek Language* will sound ΑΠΟΛΛΩΝ. From the Word חזר *rediiit, reversus, conversus est*, might come the חוּזיר *Hofir* or *Ofiris* of the *Egyptians*. The Conjunction of the *Sun* and *Moon*, perhaps, in the mythological Language, might be stiled a *Marriage*, and more particularly that Time when the *Lunations* return to the same Days of the *Month* again. This Period contains the Space of nineteen Years, and is commonly known by the Name of the *Metonic Cycle*. This, it is not unlikely, is what the *Egyptian Woman* in *Theocritus* (x) means, when she calls *Adonis* Ὀκτωκαιδέκτης ἢ ἑννεακάδεχ' ὁ γαμβρὸς. To signify, perhaps, his Setting in the Sea, they threw his *Statue* into the *Nile*, at the Celebration of his Feast, as we learn they did from these Lines; (a)

Ἀῶθεν

(x) *Idyll. 15. vers. 129.*

(a) *Idyll. 15. vers. 132.*

Ἄωθεν δ' ἅμμες νιν ἅμα δρόσω ἀθρόαι ἔξω
Οἰσεῦμες ποτὶ κύματ' ἐπ' αἰὼνι πλύνοντα.

Επὶ γὰρ τὴν θάλασσαν, says the *Scholiast* there, ἐκφέροντες τὸν Ἀδωνιν ἐρριπτον ἐπ' αὐτήν. To signify his continuing fix Months in the *Northern* Signs, and fix in the *Southern*, they seem to have feign'd, that he spent fix Months in the Arms of *Venus*, and fix in the Arms of *Proserpine*. The same Sort of Astronomical Fiction may possibly be carried on, in the Story of his being kill'd by a *Boar*. By being *kill'd*, perhaps, may be meant no more than the Loss of his Heat; which Loss is greatest when he is in *Capricorn*: Instead of which, in the *Egyptian Sphere*, there might be drawn a *Boar*; the *Asterisms*, as we shall see hereafter, having been drawn different among different Nations. It may, indeed, be no more than a *Greek Fancy*, and which might have taken its Rise from the Ambiguity of the Word חוּר *Hofir*, *Ofiris*, the
H Word

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Word חַיִּירָא *Hafira*, in the *Syriac*, and חַיִּיר *Hafir* in the *Chaldee* Language, signifying *Porcus* (*b*). And that *Plutarch* look'd upon this Story as a Fiction, appears from what he says of it in his *Symposiacs*, where he expressly stiles it μυθικόν (*c*).

BUT, to leave Philological Conjectures, for what is more immediately the Design of this Treatise, let us step again into *Chaldæa*, that Country so famous in Antiquity for the Knowledge of the Heavens.

As to the *Babylonians*, then, they confess, that their Knowledge of the Heavens was brought to them from the *Egyptians*, by one *Oannes* or *Eubadnes* (*d*), who came out of i. e. up the *Euphrates*; and

(b) See *Pf.* 80. 14. *Matt.* 7. 6.

(c) Εἰ δὲ καὶ τὰ μυθικὰ παραλαβὴν λέγεται πρὸς Ἀδωνίς ὑπὸ τοῦ Σουὸς διαφθαρεῖναι. *Lib.* 4. *Quest.* 5.

(d) *Eubadnes*, qui in *Chaldæa* de mari exiisse dicitur, *Astrologiam* interpretatus est. *Hygin. Fab.*

and, consequently, after long Voyages came to be undertaken by Sea, and which can hardly be plac'd much higher than the Reign of Solomon, as above. But Babylon lying so far within Land, and out of the Way of Correspondence with the Greeks, to whom we owe all our Knowledge of Antiquity, we cannot expect

H 2 that

274. *Berosus*, in *Euseb. Chron. pag. 6.* says, 'Εν δὲ τῷ πρώτῳ ἐνιαυτῷ Φανῆναι ἐκ τῆς Ερυθρᾶς Θαλάσσης κατὰ τοῦ ὁμοῦντα τόπου τῇ Βαβυλωνίᾳ, ζῶν ἄφρονου ὀνόματι Ὡάννην, καθὼς καὶ Ἀπολλόδωρος ἰσόρησεν, τὸ μὲν ἄλλο σῶμα ἔχον ἰχθύος, ὑπὸ δὲ τὴν κεφαλὴν παραπεφυκυῖαν ἄλλην κεφαλὴν, ἔς. Τὸτο δὲ φησὶ τὸ ζῶον — παραδιδόναι τε τοῖς Ἀνθρώποις γραμμάτων, καὶ μαθημάτων, καὶ τεχνῶν παντοδαπῶν ἐμπειρίαν. If *Abulfaragius*, in his History of the Dynasties may be credited,

كانت من الكلدانيين حكما متوسعون في فنون المعارف من المهن التعليمية والعلوم الرياضية والالهية وكانت لهم عناية بارصاد الكواكب وتحقق بعلم اسرار الفلك ومعرفة مشهورة بطبايع واحكامها النجوم واحكامها *Fuerunt, autem, è Chaldaeis Sapientes, qui amplos progressus fecerunt in variis Artium liberalium, Scientiarumque Mathematicarum, & Theologicarum generibus; summè autem excelluerunt in Observatione Syderum, veràque Arcanorum Caeli Indagatione,*

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that they should have borrow'd much from thence. And so, in Fact, we shall find it; the *Pole*, the *Gnomon*, and the *Division of the Day into twelve Parts*, being the only Things they confessedly learnt of the *Babylonians* (e).

I r

tione, & insigni naturæ Stellarum, earumque indiciorum peritiâ. Whatever Truth there may be in this, what follows presently after is much more certain ;

ولم يصل إلينا من مذاهب الكلدانيين في حركات
الاجرام ولا من ارضادهم غير الارصاد التي نقلها عنهم
بطليموس القلوذي في كتاب المجسطي فانه اضطر
اليها في تصحيح حركات الكواكب المتخيرة اذ لم
يجد الاصحاح اليونانيين ارضادا يثبت بها

*Ad nos autem non pervenit è placitis Chaldaeorum circa
Motions Stellarum, vellearum Observationibus, quicquam
præter ea, quæ ab illis transfudit Ptolomæus Claudius in
Almagesto. Ille enim coactus est illis uti in verè definiendis
Planetarum Motibus, cum non inveniret inter Græcos
suos observationem, cui fidem tunc adhibere posset.* pag. 47.

(e) Πόλον μὲν γὰρ καὶ γνώμονα, καὶ τὰ δώδεκα
μέρεα τῆς ἡμέρης παρὰ Βαβυλωνίων ἔμαθον Ἕλλη-
νες, *Herodot. pag. 127.* Χαλδαῖοι δὲ περιεργότατοι
γενόμενοι, ἐτόλμησαν τὴν ἥλιν τὸν δρόμον, καὶ τὰς
ἡμέρας διορίσασθαι, says *Achilles Tat. pag. 137.* In-
deed, in after Times, by long Observation, they
found the mean Motion of the *Moon* for a Day to be.

It were, indeed, much to be wish'd, that *Herodotus*, to whom we are indebted for this Account, had been more particular,

13° 10' 35" Τοιαύτης δὲ τῆς διατάξεως ὑπαρχέ-
σης τῶν Ἀριθμῶν ὑπὸ τῶν Χαλδαίων εὐρεῖται ἡ
μείσις κίνησις τῆς Σελήνης 17' 1' 45". *Gemin. apud*
Petav. Uranolog. pag. 62. *Geminus* is supposed to
have been contemporary with *Tully*. How long be-
fore this Time the *Chaldeans* had settled in this Manner
the Motion of the Moon, is uncertain; but the oldest
Tables of the *Heavenly Motions*, now extant, are those
of *Ptolemy*, about the Year after *Christ* 140. If *Di-*
dorus Siculus, pag. 116. says true, that the *Chaldeans*
Τὰς δ' ἄλλας τέσσαρας (*Planetas*), ὁμοίως τοῖς
παρ ἡμῖν ἀστρολόγοις, ὀνομάζουσιν Ἀρεως, Ἀφροδίτης,
Ἑρμῆ, Διός, one would be apt to imagine, that the
Chaldeans received the Names of the *Planets* from the
Greeks, and not the *Greeks* from the *Chaldeans*. They
might, indeed, have discovered them to have a Motion
of their own, and admitted them into their *Astrology*;
calling them, as he says they did, by the general Name,
Ἑρμηνεῖς, perhaps מְלִיצִים מְלִאכִים, ὅτι τῶν ἄλ-
λων ἀστέρων ἀπλανῶν ὄντων καὶ τεταγμένῃν ἐχόντων
πορείαν, ἔτσι μόνον πορείαν ἰδίαν ποιῶμενοι, τὰ μέλ-
λην γίνεσθαι δεικνύουσιν, ἐρμηνεύοντες τοῖς Ἀνθρώ-
ποις τὴν τῶν Θεῶν εὐνοίαν. *ibid.* But the *Greeks* might
give each of them its Name in particular. *Diodorus*,
however, may possibly intend no more, than that both
Chaldeans and *Greeks* called them by Names, in Sound
very

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cular, especially with Regard to the *Pole* and the *Gnomon*. In the Writings of latter *Astronomers*, the Word *Pole* signifies the Extremity of the *Earth's Axis*, imagined to be continued to the *fix'd Stars*: But that this was the Meaning of the Word amongst the early *Historians* and *Philosophers of Greece*, or that the *Babylonians* had the least Notion of the *Earth's Axis*, may well admit of some Dispute. In *Aristophanes*, and others, the Word ΠΟΛΟΣ signifies the same
as

very nearly the same: But of this more hereafter. This mean Motion of the Moon of $13^{\circ} 10' 55''$ in a Day, here said to have been discovered by the *Chaldeans*, is the same that we now find in some *Astronomical Tables*. But the late learned Dr. *Halley*, in the *Miscell. curios.* vol. 3d, says, he thinks he can demonstrate that her Motion doth accelerate, and with sufficient Observations of her *Phases* in Eclipses at *Bagdat*, *Aleppo*, and *Alexandria*, could shew in what Proportion. But how little the *Chaldeans* were acquainted with the true Motion of the Sun, appears from what *Achilles Tatius* farther adds, that λέγων δὲ πάλιν ἀνδρῶς πορείαν, μήτε τρέχοντος, μήτε ἡρέμα βαδίζοντος, μήτε γέροντος, μήτε παιδός, τὴν πορείαν εἶναι τῇ ἡλίῳ, ἢ λ' ἑαδίῳ καθαρῶν εἶναι. That is three Miles and $\frac{1}{4}$ in an Hour, allowing eight *Stadia* to a *Μίλε*.

as ἔρανος, in general; (f) and so, likewise, it is explained by Hesychius (g): But in what Sense, according to this Interpretation, could the Greeks be said to borrow the Pole from the Babylonians? Did they not know there were Heavens, or a Sky, before the Babylonians told them so? Or did they borrow all that they knew concerning this Matter from them? It is certain that Herodotus could mean neither of the two: And yet, since he has left us only to guess at his Intention, we may not be very far mistaken, perhaps, if we suppose he would be understood to mean the making of a Sphere, or, as is most likely, a broad Circle only, representing the Season,

or

(f) Πόλον οἱ παλαιοὶ ἐκ ὧς οἱ νεώτεροι σημείον τι καὶ πέρασ ἀξον^ς, ἀλλὰ τὸ περιέχον ἅπαν ἐμάλυν. *Sehaliast on Aristoph. Aves, vers. 179.* And Τὸ τῷ πόλῳ σύμπαντι^ς ἡμισφαίριον in *Athenæus Deipnos. L. 2.*

(g) Πόλος, ἔρανος, κόσμος, καὶ ἡ μεταβεβλημένη γῆ εἰς καλασποράν, κύκλος, καὶ τόπος καρρυφῆς κυκλοειδῆς, ἢ ἄξων.

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or *Order* of the *Heliacal* Risings of such Stars, as they were then acquainted with.

AND, to confirm this Conjecture, it may be remark'd, that *Pausanias* tells us of one *Bupalus*, a *Smyrnaean*, that made a Statue of *Fortune*, with a *Pole* upon its Head (*b*); and of *Endæus*, that (he supposes) made another of *Minerva*, (*i*) in the same Manner. Such may we imagine were the Spheres of *Museus*, (*k*)
Atlas,

(*b*) Βέπαλ⊙ δὲ, ναὺς τε οἰκοδομήσασθαι καὶ ζῶα αὐτῇ ἀγαθ⊙ πλάσαι, Σμυρναίοις ἀγάλμα ἐργαζόμεν⊙ Τύχης, πρῶτος ἐποίησεν, ὧν ἴσμεν, ΠΟΛΛΟΝ τε ἔχουσιν ἐπὶ τῇ κεφαλῇ. *Pag.* 140. *Edit.* 1583.

(*i*) Ἐστὶ δὲ ἐν Ἐρυθραῖς, καὶ Ἀθηναῖς Πολιάδ⊙ ναὸς, καὶ ἀγάλμα ξύλινον, μεγέθει μέγα, καθήμενον τε ἐπὶ θρόνῳ, καὶ ἡλακάτην ἐν ἑκατέρῃ τῶν χειρῶν ἔχει, καὶ ἐπὶ τῆς κεφαλῆς πόλον. *Pausan.* *pag.* 210.

(*k*) Καὶ τὸν μὲν, Ἐυμόλπε παῖδα Φασὶ, ποιῆσαι δὲ Θεογονίαν καὶ σφαῖραν πρῶτον. *Diog. Laert.* *Præcep.*

Atlas (1), *Chiron* (m), and *Biliarius* (n).

THAT these three several Inventions came into Greece at the same Time, is

I by

(1) Sphæram ipsam ante multò *Atlas*, *Plin. Nat. Hist. L. 2. c. 8.* *Atlas* in Historia formatur sustinens mundum; ideo quòd is primùm Cursum Solis, & Lunæ, Siderumque omnium ortus & occasus, Mundique versationum rationes, vigore animi solertiaque curavit hominibus tradendas; eaque re a Pictoribus & Statuariis deformatur, pro eo Beneficio, sustinens Mundum, *Vitruv. Architec. L. 6. c. 10.* Hic *Atlas*, says *Servius*, *Iapeti Filius*, in *Africa* natus dicitur: Hic, quòd annum in tempora divisit, & primus Stellarum Cursus, vel Circulorum, vel Siderum transitum naturasque descripsit, Cælum dictus est sustinere: quia Nepotem suum *Mercurium* & *Herculem* docuisse dicitur: Unde & *Hercules* cælum ab *Atlante* susceptum sustinuisse narratur, propter Cæli Scientiam traditam. *Ad Virg. Æn. 1. vers. 745.* And *Diodorus Siculus* to the same Purpose tells us, Περὶ τότερον γὰρ αὐτὸν τὰ κατὰ τὴν Ἀστρολογίαν ἐκπεποιηκότες, καὶ τὴν τῶν ἄστρον σφαῖραν φιλοτίμως ἔχοντες, ἔχειν ὑπόληψιν ὡς τὸν κόσμον ὅλον ἐπὶ τῶν ὤμων φέροντας pag. 233.

(m) *Sir Isaac Newton's Chronology*, pag. 163, 164.

(n) *Strabo. Geograph. pag. 546.*

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by no Means probable; though the distinct *Æra* of each may be hard to settle: What can be determin'd in a Matter of so much Intricacy, will be seen as we proceed with the Progress of *Astronomy* amongst the *Greeks*.

WHAT was the early State of that People before the *Argonautic Expedition*, or the *Destruction of Troy*, would be an useless Enquiry, and too much beside the present Purpose. Their Condition, before the *last* of these two Periods, is by *Thucydides* himself (o) acknowledged to have been too weak, to attempt any Thing of Consequence, or as united in a Body. Nor is this to be admired at, since it was but a few Generations before, that *Pelops*, a *Lydian*, (p) an *Asiatic*,

(o) Πρὸ γὰρ τῶν Τρωϊκῶν ἔθεν φαίνεται πρότερον κοινῇ ἐργασαμένη ἡ Ἑλλάς. pag. 4. §. 3.

(p) Ὁ Οἰνόμας ἐπαύθη τῆς Ἀρχῆς, διαβάνας Πέλοπα τῷ Λυδῷ ἐκ τῆς Ἀσίας, Pausan. pag. 148.

tic (*q*), it is certain, landed there, and settled himself and Followers; and not many Years earlier, if at all, that *Lelex* (*r*), and *Danaus* (*s*), *Egyptians*, had done the same.

WHATEVER were the old Inhabitants of the Country, they were oblig'd to submit to the new *Invaders*, the *Gods* that vanquish'd the *Titans* (*t*): And these retaining their Country Custom of

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obser-

(*q*) Λέγεται δὲ καὶ οἱ τὰ σαφέστατα Πελοποννησίων μνήμη παρὰ τῶν πρότερον δεδεγμένοι, Πέλοπα τε πρῶτον πλήθει χρημάτων, ἃ ἤλθεν ἐκ τῆς Ἀσίας ἔχων, Ἦσ. *Thucydid. pag. 8. §. 9.*

(*r*) Δωδεκάτη δὲ ὕστερον μετὰ Κάρα τὸν Φορυνέως γενεᾷ, λέγουσιν οἱ Μεγαρεῖς, Λέλεγα ἀφικόμενον ἐξ Αἰγύπτου βασιλεῦσαι. *Pausan. pag. 37.*

(*s*) Δαναὸς δ' ἀπ' Αἰγύπτου πλεύσας ἐπὶ Γελάνορα τὸν Σθενέλα, τὰς ἀπογόνους τὰς Ἀγνῶστοι βασιλείας ἔπαυσεν. *Pausan. pag. 58.*

(*t*) *Titans*, ἀπὸ τῆς τίσσεως, *ab ultione*, says *Servius* on *Æneid* 6. *vers. 580.* because they were produc'd by the Earth, to revenge herself on the *Gods*. From the *Giants* and *Titans* being *Earth-born*, we may gather that they were born in the Country,

where

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observing the Stars (*u*), laid the Foundation of that *Astronomy*, whose Origin was ascribed by some, says *Achilles Tatius*,

where the *Invaders* found them. From the Fiction, that in this War some of the Gods fled into *Egypt*, and there lay hid under the Forms of different Animals, according to *Servius* on *Æn.* 8. *vers.* 698, it should seem as if the *Egyptians*, that were afterwards deify'd, and became the Gods of *Greece*, were Parties concern'd. That the *Egyptians* should settle themselves in a new Country, without Opposition, is scarce to be conceived. The Names of the *Giants*, *Enceladus*, *Othus*, and *Typhæus*, seem all to favour of that one original Language, that may still be more or less trac'd out in all the several Dialects of *Europe*, and is yet more preserved in the *Hebrew* and *Arabick* Languages. The Verb *كَلَدَ* *kalad* signifies, among other Things, *Collum monili ornavit*: So that *Enceladus* may be no more than what the *Romans* called afterwards *Torquatus*; and from the same Custom a whole People in *SS.* was called *אֲנָחִיטִי Anatim*, from *אָנָה* a Verb of the like Import. See *Numb.* 13. 33. *Deut.* 2. 21.

(*u*) Κόσμος δὲ ἐν τῷ πρώτῳ Ἀιγυπτιακῷ, καὶ Λεῶν ἐν πρώτῳ τῶν πρὸς τὴν Μητέρα, καὶ Κρωσσὸς ἐν αἱ γεωγραφικῶν τῆς Ἀσίας, πάντων ἀρχαιοτάτους Ἀιγυπτίους Φασί· καὶ ἐν Ἀιγύπτῳ πρώτῃ ἐκισθῆναι πόλιν Θήβας—γεγοῖναι δὲ αὐτὸς Φασί· ἢ Ἀπολλώνιος πρὸ τῷ ΗΑΝΤΑ ΤΑ ΑΣΤΡΑ Φανῆναι,

sius (x), to the Gods, by others to the Heroes, and by others again to the Wise Men: An Account, consistent enough with itself, and with what *Herodotus* assures us, that the Gods of the Greeks were of *Egyptian Extraction* (y).

For, by the Model of *Danaus's Ship* (x) others were built; and with these they

φανῆναι, καθὸ τὴν τε φύσιν καλανεῖσθαι αὐτῶν δοκεῖ καὶ τὰ ΟΝΟΜΑΤΑ εἶναι· καὶ τὰ μὲν δώδεκα ζῶδια θεῶς Βυλαίης προσηγόρευσαν, τὸς δὲ Πλανήτας, ραβδοφόρους· Schol. on *Apollon. Argon.* pag. 185.

(x) Αἰγυπτίως λόγῳ ἔχει πρῶτος τὸν ἱερὸν ὡς καὶ τὴν γῆν καταμετρεῖσθαι, καὶ τὴν ἐμπειρίαν τοῖς ἱερεῶσι ἐν σήλαις ἀναγράφαι· Καλδαῖοι δὲ εἰς ἑαυτοὺς μεταγυῖαι, Βάλλω τὴν ἵερωσιν ἀναθίεντες· Οἱ δὲ Ἕλληνας Σοφοί, ὅτε μὲν Θεοῖς, ὅτε δὲ Ἡρώσιν, ὅτε δὲ τοῖς μεταταῦτα Σοφοῖς ἀναθιέειν· In *Arat. Phaenom.* apud *Petav. Uranolog.* pag. 121.

(y) Σχεδὸν δὲ καὶ πάντα τὰ ὀνόματα τῶν Θεῶν ἐξ Αἰγύπτου ἐλήλυθε εἰς τὴν Ἑλλάδα· διότι μὲν γὰρ ἐκ τῶν Βασιλέων ἦκει, πυρραυόμενοι ὅτι ἱερίστων ἰόν· Pag. 108. Edit. Gronov.

(x) The first Ship the Greeks built, is allowed to be *Argo*;

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they made short Excursions to the little Islands that lay round about; by which Means, at the Time of the *Trojan War*, *Agamemnon* was enabled

Πολλῇσι νήσοισι καὶ Ἄργεϊ παντὶ ἀνάσσειν (a).

Now, then, being obliged to be out all Night upon the Water, they had great Opportunities of observing the Heavenly Bodies: And, indeed, they were under some Sort of Necessity for so doing, both in Order to know how the Night passed, and what Season of the Year was dangerous, or not, for sailing; Things principally determin'd in those Days by the *Risings* and *Settings* of the *Stars*.

Navita

Ulla rudem cursu prima imbuit Amphitriten.

Catull: de Nupt. Pel. & Thet: vers. 11.

Ταύτην (*Argo*) δὲ φασὶ πρώτην ναῦν γενέσθαι μακράν· ἄλλοι δὲ λέγουσι Δαναῶν διακόμενον ὑπὸ Ἄιγύπτου πρώτου κατασκευάσαι· ὅθεν καὶ θαναῖς ἐκλήθη·
Schol. on Apollon. Argonaut.

(a) *Homer. Iliad. 2. vers. 108.*

*Navita tum Stellis Numeros & Nomina
fecit (b);*

A Thing not to be avoided, for Distinction Sake; and which gave Occasion to the making Assemblages of them, or *Constellations*, agreeable to the fanciful Genius of that People. That these were the two Uses made of the *Risings* and *Settings* of the *Stars*, that I have here assign'd, will be evident, both from *Euripides* (c) and *Hesiod*; in the former of which

(b) *Virgil. Georg. I. vers. 137.* Navigandi quippe Peritiam sequitur Studium Motus & Rationes Syderum cognoscendi, propter Tempestatem Maris & Ventorum Motus. *Serv. in Loc.* Περὶ πολλὰ δὲ μάλιστα τούτων τὴν γνώσιν ἐποιεῖν οἱ εἰδέναι, οἱ περὶ γεωργίαν καὶ ναυτιλίαν τὸν βίον ἔχοντες· ἐκ γὰρ τῶν ἀνατολῶν καὶ τῶν δύσεων αὐτῶν, τοῦ καιροῦ τε πλῆ, καὶ τῆ τετυγνητῆ ἐσημειῖντο. *Achill. Tat. pag. 164.*

(c) *Rhesus, vers. 527.* And so again, *Iphigen, in Aul. vers. 6.*

Αγ. Τίς ποτ' ἄρ' ἀστὴρ Quæ Stella hæc vehitur
ὅδε πορθεμένει; Cælo?

Πρρ.

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principal Persons, said to have been *Observers* of the *Stars*, and the *Founders* of this *Science*.

Tu Princeps Auctorque sacri, Cyllenie,
tanti,

says *Manilius* (e). This *Mercury* was contemporary with *Pelops*, as appears from *Homer*, by his giving him a *Scepter*, which was continued down in the Family to *Agamemnon*,

----- πατρώϊον ἄφθιτον αἶψι (f).

Arcas, the Grandson of *Lycaon*, the Son of *Pelafgus*, is by the *Scholiast* on *Apollo-nius* (g), said to be the same with *Endymion*,

(e) *Astronom. Lib. 1. vers. 30.*

(f) *Iliad. 2. vers. 46. & 186.* See the Hands the Scepter passed through, *vers. 101, &c.*

(g) Τινὲς δὲ φασὶν Ἐνδυμίωνα εὐρηκέναι τὰς Περιόδους καὶ τὰς Ἀριθμὺς τῆς Σελήνης. ὅθεν καὶ προσελήνυσ τὸς Ἀρκάδας κληθῆναι. Ἀρκας γάρ ὁ Ἐνδυμίων. pag. 185. See likewise *Pliny, Lib. 2. c. 9.*

dymion, and an Observer of the *Moon*; which probably gave Occasion to the Fiction of that *Planet's* falling in Love with him. *Atræus*, the Father of *Agamemnon*, is said to have been an Observer (*b*), and by *Euripides* introduced as saying,

Δείξας γὰρ Ἀστρων τὴν ἐναντίαν ὁδὸν,
Δήμῃς τ' ἔσῳσα, καὶ Τύραννος ἰζόμεν'

That is, says *Achilles Tatius* (*i*), τὰς τῶν πλανήτων ὁδὸς ἐναντίας τοῖς λοιποῖς φερομένης, αὐτῷ πάλιν Ἀτρεῖ περιτιθείς ascribing to *Atræus* the observing the Paths of the *Planets*, that are carried contrary to the rest of the *Stars*. But, instead of *Planets*,

K 2

(*b*) *Servius* explains the Story of *Atræus* and *Thyestes*, thus: *Atræum apud Mycenæ primum Solis eclipsim invenisse, cui invidens Frater ex urbe discessit, tempore quo ejus probata sunt dicta.* In *Æneid.* 1. vers. 572.

(*i*) In *Arat. Phænomen.* apud *Petav. Uranolog.* pag. 123. And again he says, Ἀτρεὺς γὰρ εὗρε τῶν πλανήτων τὴν ἐναντίαν Φορὰν. *ibid.* pag. 140.

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nets, perhaps, he should have said only the *Sun* and *Moon*, by the old *Greek* Writers sometimes called *Ἄστρα* (*k*); unless *Euripides* may be supposed speaking according to the Language of his own Time. And since he observed the Course of the *Sun*, he probably mark'd, in such a rude Manner as he was able, the *Solstice*; which gave Occasion to the Fable of the *Sun's* going back, at the *Entertainment* which he gave his *Brother* (*l*).

BESIDES

(*k*) Ἴστίον δὲ ὅτι ἀστὴρ μὲν ἐστὶν ὃ καὶ μόνον ἐστὶ, καὶ ἡ καθ' αὐτὸν κινεῖται, ὅσον Κρόνον, Ζεὺς, καὶ τὰ τοιαῦτα. ἄστρον δὲ τό, τέ κινῶμενον, καὶ τὸ ἐκ πλείων ἀστέρων σύστημα, οἷον Καρκίνος, Λέων. Καὶ ἐπίπολὴ δὲ τίνος ἀστέρος νεωλερίζουσα τί τῶν περιγέγων ἄστρον λέγεται, οἷον Ἀρκτέρου ἐπιτολή. λέγεται δὲ καὶ ὁ ἭΛΙΟΣ ἈΣΤΡΟΝ ἰδίως· παρὰ δὲ Πινδάρῳ, ἄστρον ὑπέρτατον· νῦν δὲ ὁ Ἀράτος τὴν ἀστέρας ἄστρον ἔρηκε. *Theon in Arat. pag. 3. Edit. Oxon.*

(*l*) Or, perhaps, it was about the *Solstice*, that he made that Feast. And this, I think, is the most probable of the two; the Fiction taking its Rise long after, from the Tradition.

BESIDES these, *Æschylus*, in his *Agamemnon* (m), introduces one as saying,

"Ἀστρων καὶ τοῖδ' αὖ νυκτέρων ὁμῶγερον,
καὶ τὰς Φερουῖας χεῖμα καὶ Σέρος βροχαῖς
λαμπρὸς Δυναῖας, ἐμπρέπουσας αἰθέρι·

As to *Palamedes*, who lived at the Time of the *Trojan War*, he invented, says *Nauplius* in *Sophocles* (n), among other Things,

ἡρώεα τε σήματα·

And again,

"Ἐφεύγε δ' ἄστρον μέτρα, καὶ περιστροφάς,
Ἀρκτικὴ στροφάς τε, καὶ Κυνὸς ψυχρὰν δύσιν (o).

About

(m) Vers. 46.

(n) *Achilles Tatius*, in *Petav. Uranolog.* pag. 122.

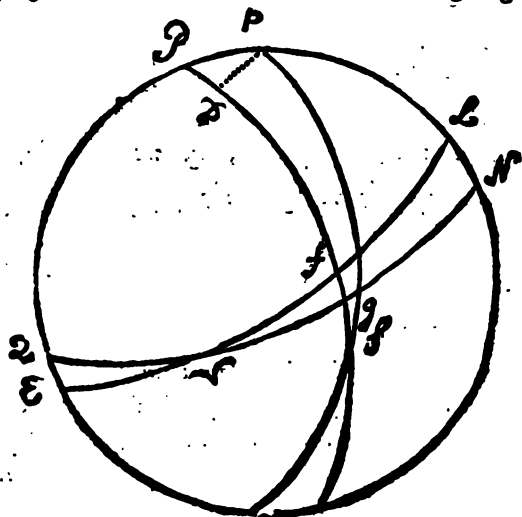
(o) If we suppose that *Sophocles* speaks agreeably to his own Time, we shall find that *Sirius* set Cosmically

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About the same Age, perhaps, liv'd *Astræus*, whom they say,

"Astræus"

cally, then, when the Sun was in $\phi 15^{\circ} 32' 37''$. *Sophocles* was born in the second Year of the 71st *Olympiad*, and died at 90 Years of Age, or in the Year before *Christ* 405. From which Time to the Year 1743, compleat, is 2148 Years; the *Præcession* answering to which is $28^{\circ} 38' 24''$. The Place of *Sirius*, at the End of the Year 1689, according to the *British Catal.* was $\alpha 9^{\circ} 49' 1''$ and its *Latitude* $39^{\circ} 32' 8''$. So that its Place in the Year before *Christ* 405 was $\pi 11^{\circ} 10' 37''$. Let the Place of Observation be *Athens*, in $37^{\circ} 25'$ North *Latitude*, and where the Height of the *Equator* is $52^{\circ} 35'$. The *Latitude* of *Sirius*, as was said, is $39^{\circ} 32' 8''$ South. Then in the following Figure



we

amongst the Antients. 71

we have Pp the Distance of the Poles of the *Ecliptick* and *Equator*. $= 23^{\circ} 29'$. E or L the *Ecliptick*. Q or N the *Equinoctial*. S the Place of *Sirius*. Sf its *Latitude*. sg its *Declination*. The Angle $pPS = 18^{\circ} 49' 23''$. Then

$$\begin{array}{r}
 \text{Sin. } Pp \ 23^{\circ} 29' \text{ ————— } 9,600409 \\
 - \text{R. } \dagger \text{ Sin. } P. \ 18^{\circ} 49' 23'' \text{ — } 9,508588 \\
 \hline
 \text{Sin. } Dp \ 7^{\circ} 23' 4'' \text{ — } 9,108997 \\
 \text{Rad. } \dagger \text{ Tang. } Dp \ 7^{\circ} 23' 4'' \text{ — } 19,112543 \\
 - \text{Tang. } P \ 18^{\circ} 49' 23'' \text{ — } 9,532442 \\
 \hline
 \text{Sin. } PD \ 22^{\circ} 21' 2'' \text{ — } 9,580101 \\
 \text{Then } PS - PD = DS = 107^{\circ} 11' 6'' \\
 \text{Cof. } DS \ 107^{\circ} 11' 6'' \text{ — } 9,470858 \\
 - \text{R. } \dagger \text{ Cof. } Dp \ 7^{\circ} 23' 4'' \text{ — } 9,996383 \\
 \hline
 \text{Cof. } pS \text{ — } 107^{\circ} 3' 10'' \text{ — } 9,467241
 \end{array}$$

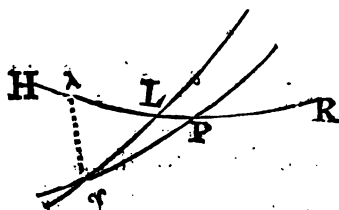
And $pS - pg = 17^{\circ} 3' 10'' = sg$. the *Declination* of *Sirius*.

Again, in the same Figure,

$$\begin{array}{r}
 \text{Sin. } P S. \ 129^{\circ} 32' 8'' \text{ — } 9,974257 \\
 \text{Sin. } P. \ 18 \ 49 \ 23 \text{ — } 9,508585 \\
 \hline
 19,482842 \\
 - \text{Sin. } pS \ 107^{\circ} 3' 10'' \text{ — } 9,980474 \\
 \hline
 \text{Sin. } Pp \ 161^{\circ} 27' 39'' \text{ — } 9,502368
 \end{array}$$

The

In the Figure annex'd, then, we have H R a Portion of the *Horizon*; \cap L a Portion of the *Ecliptick*; \cap P the oblique De-



scension of *Sirius*, $57^{\circ} 53' 27''$; L \cap P the Obliquity of the *Ecliptick*, $23^{\circ} 29'$; L P \cap = the Height of the *Equator* at *Athens* = $52^{\circ} 35'$.

Then $\text{Cof. } \cap$ P =	$57^{\circ} 53' 27''$	—	9,725586
Tang. L P \cap =	$52^{\circ} 35' 00''$	—	10,116328
$\text{Cot. P } \cap$ λ =	$55^{\circ} 12' 18''$	—	19,841914

But P \cap λ —	$55^{\circ} 12' 18''$
— P \cap L —	$23^{\circ} 29' 00''$
L \cap λ —	$31^{\circ} 43' 18''$

Then $\text{Cof. P } \cap$ λ —	$55^{\circ} 12' 18''$	—	9,756363
Tang. \cap P —	$57^{\circ} 53' 27''$	—	10,202254
		Sum.	19,958617
— $\text{Cof. L } \cap$ λ —	$31^{\circ} 43' 18''$	—	9,929736
Tang. \cap L —	$46^{\circ} 54' 13''$	—	10,028881

But the Point of the *Vernal Equinox*, in the Year before *Christ* 405, was \cap $28^{\circ} 38' 24''$; to which if we add \cap L just found = $46^{\circ} 54' 13''$, we shall have \cap $15^{\circ} 32' 37''$; the Point of the *Ecliptick*

I,

setting

Ἄσρων ἀρχαίων πατέρ' ἔμμεναι,

according to *Aratus* (*p*), *i. e.* who was an *Observer*, and perhaps formed one of the old Constellations, as *Nauplius* (*q*), a Descendant of *Neptune* and *Amymone*, Daughter of *Danaus*, and who lived, according to some (*r*), about the Time of

setting along with *Sirius*; the Point opposite to which is $\pm 15^{\circ} 32' 37''$. So that *Sirius* would set in the Morning, or cosmically, that Year, when the Sun was in $15^{\circ} 32' 37''$ of *Sagittary*, *i. e.* about the 14th of *December*; the apparent Time of the *Autumnal Equinox* being at *London*, that Year, *September* the 27th, $22^h 59' 49''$, that is, *September* the 28th, $59' 49''$ past 10 at Night.

(*p*) *Pag.* 15. where the *Scholiast* observes, Τινὲς δὲ Φασὶν Ἄσρων ἀρχαῖον γεγονέναι μαθηματικόν, τὸν πρῶτον εὐρόντα τὴν τῶν ἄσρων ὀνομασίαν, ὅθεν καὶ πατέρα ἄσρων ἐπικαλεῖσθαι.

(*q*) Ἀπόγονος τῷ Ἀρχαίῳ, τῷ Ποσειδῶνος υἱῷ καὶ Ἀμυμώνῃ τῇς Δαναῶ. *Schol. on Apollon. Argon. pag.* 7. See the *Scholiast* on *Aratus*, *pag.* 7, where he says, Διτλαῖ δὲ εἰσιν, ὧν τὴν μὲν Ναύπλιος ἔφερε, τὴν δὲ δευτέραν, τὴν ἐλάσσονα, Θαλῆς ὁ σοφὸς.

(*r*) Δεδόσθω γὰρ Ποσειδῶν εἶναι, Ἀμυμώνης δὲ πῶς, τὸν κατὰ τὰ Τρῳικά ἔτι ζῶντα; *Strabo Geog.*

of the Trojan War, did the Great Wain.

FROM the Account, then, here given, it is not to be wondered at, that, as *Achilles Tatius* (*s*) says, Τινες δὲ ἄλλον ἄλλο τι εὐρηκέναι, διό κ' συμβέβηκεν εἶναι διαφωνίαν περὶ τῆς εὐρέσεως αὐτῶν. *Different Inventions are ascribed to the same Persons, and that there are various Opinions concerning the Authors of particular ones.* This much, however, I think, may certainly be collected upon the whole, that about the Time of the *Argonautic Expedition*, the *Greeks* had begun to observe the Heavens; and, therefore, that *Laertius* (*t*) may be credited, when he informs us, that *Museus*, one of them, made the first *Sphere*.

L 2

That

Geog. pag. 254. So uncertain are the Traditions of those early Times.

(*s*) *Ad Arat. Phœnom. apud Petav. Uranolog. pag. 123.*

(*t*) *See above Note (k).*

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That Expedition is by *Petavius* placed 1226 Years before *Christ*: A Date, indeed, much too early, considering that it could not be many Years before the *Trojan War*; *Castor* and *Pollux*, two of the *Argonauts*, being Brothers to *Helen*, and the *Trojan War* evidently happening after the Time of *Sesostris* (u).

AMONGST the Makers of *Spheres*, as was said, is likewise reckoned *Atlas* (x), by some mistaken for the *Libyan*; but he was, undoubtedly, either an *European*, (y) or an *Asiatic*, and one Generation

(u) *Herodotus* places it in the Reign of *Proteus*, Successor to *Phoron*, Son of *Sesostris*, pag. 128. But of this I shall have occasion to say more in another Place.

(x) See above, Note (f).

(y) *Atlas* was Father of the *Pleiades*, (*Schol. Diodym.* on *Iliad* Σ , vers. 846.) One of these, nam'd *Electra*, was Mother of *Dardanus*; she not enduring to see *Troy* taken, disappeared, whence the Seven Stars, as they are commonly called, came to be only Six, *ibid.* But it is hardly probable, that the Father of *Dardanus* should marry the Daughter of *Atlas*, at the western Extremity of *Lybia*.

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ration older than *Pelops*, and so something prior to *Museus*. His making a *Sphere*, then, may possibly be a Mistake of *Pliny*, or of the Author from whom he transcribed this Account; but that he was an *Observer*, may be collected from the Fiction of his supporting the Heavens; unless we suppose the *Person* and *Hill* confounded together by a Similarity of Names,

THE Author of the *Titanomachia*, cited by *Clement Alexandrinus*, (z) says, that *Ghiron*

Ἐἰς τε δικαιοσύνην θνητῶν γενέσθαι ἡγάγε, δείξας
Ὅρκον, καὶ θυσίας ἱλαράς, καὶ ΣΧΗΜΑΤ'
ὍΛΥΜΠΟΥ.

*The Rules of Right Mankind be taught,
the Gods
T' appease with Victims, and an Oath re-
vere,*

And

(z) *Stromat.* pag. 224. Edit. Lugd. Bat. 1616.

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*And mark the Signs that gild the shining
Sphere.*

WHAT Credit this Author is of, or what is to be understood by his σχήματ' ὀλύμπιαι, is hard to say. Some Persons, whose Names are too great to be mentioned but with Reverence, suppose from hence, that he formed the *Constellations* for the Use of the *Argonauts*. If, as it seems, he meant all those that are mentioned in the *Sphere* of *Eudoxus*, it is more, I am afraid, than can well be allowed. That he might be an *Observer*, indeed, is not improbable, being contemporary with those, who, as we have seen above, confessedly were so. A late ingenious Writer, indeed (a), says, he cannot find that *Chiron* was a *practical Astronomer*, or ever looked upon by the Antients as such. But the

Scholiast

(a) *Squire's Vindication of the Greek Chronology*,
pag. 108.

Scholiast on *Apollonius* (b) cites *Staphylius*, as saying expressly, that he was Ἀστρονομίας ἔμπειρος, i. e. I suppose, acquainted with the *Risings* and *Settings* of such Stars, as had in his Time been taken notice of, and the *Heats*, and *Colds*, and *Rains*, with other Affections of the *Atmosphere*, attending them.

THUS have we brought down this Science, as well as we are able, from its earliest Original, to the Time of the *Trojan War*; a Period much controverted amongst Chronologers, but by Sir *J. Marsham* placed *Ann. Per. Jul.* 3505,
or

(b) Σταφύλος δ' ἐν τρίτῳ τῶν περὶ Θεσσαλίων ἱστορεῖ Χείρωνα σοφὸν ὄντα καὶ Ἀστρονομίας ἔμπειρον, βυλόμενον τὸν Πηλέα ἐνδοξον ποιῆσαι, μελαπέμψασθαι τὴν Ἀρκτορος θυγατέρα τῇ Μυρμιδόνος, καὶ λόγους διασπεῖραι ὅτι μέλλει γαμεῖν τῇ Θέτι· ὃ Πηλεὺς, Διὸς διδόντος αὐτῷ· οἱ δὲ Θεοὶ μετ' ὄμβρου καὶ Χειμῶνος ἤξουσιν εἰς τὸν γάμον· ταῦτα Φημίσας παρετήρει τὸν χρόνον, ἐν ᾧ ὕδατων ἔμελλεν ἔσσεσθαι ἐπομβρία, καὶ πνεύματα ἐξαΐσιν· καὶ δίδωσι Πηλεῖ Φιλομήλαν· καὶ ἔτιωσ' ἐπεκράτησεν ἢ Φήμη ὃ τι τὴν Θέτιν ἔγημεν· pag. 205.

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or 1208 before *Christ*; above 200 Years earlier than it is probable it really happened.

BE that as it will, it is apparent, that as yet *Astronomy* continued in its Infancy, and consisted of nothing more than Observations; and those, it is likely, very rude ones. This too was its State when *Hesiod* wrote (*c*), the oldest Author in the World that mentioneth any Thing of *Constellations*, and of which he knew but very few. *Sirius*, if it be taken for the Star in the *Dog's Mouth*, seems, by its very Name (*d*), to have been
of

(*c*) How indifferent an Opinion the *Greeks* themselves had of the *Astronomy* of their Countrymen in *Hesiod's* Time, appears from *Plato's Epinomis*, *Ἀστρονομίαν ἀγνοεῖτε*, says he, *ὅτι σοφώτατον ἀνάγκη τὸν ἀληθῶς ἀστρονόμον εἶναι, μὴ τὸν καθ' Ἡσίοδον ἀστρονομῶντα, καὶ πάντας τὰς τοιαύτας, οἷον θυσμὰς τε καὶ ἀνατολὰς ἐπεσκεμμένον*.

(*d*) By the *Arabs* called *شعرى* from *شعر* *ardat*, *Heb.* *רעש*; which, though it be not found in that Sense now, yet undoubtedly signified formerly
Radies

of foreign Original, as well as *Orion* (e);

M the

Radios Pilorum instar projicere, or something equivalent. And this seems to appear from the Senses given to it in modern Lexicons, which should be looked on only as secondary or derivative ones. Dr. Hyde, indeed, in his Notes on *Ulugh Beigh*, pag. 50, says, *Nomen Σείριος* (ut mihi quidem videtur) *produxit Arabicum شيرى Shiri, quod tamen Arabes enuntiant Shira*. But this small Difference in the Pronunciation is of no Weight. According to the Greeks it is called ΣΕΙΡΙΟΣ, because σειράει. So *Aratus*, pag. 44.

————— ἡ δὲ οἱ ἄκρη
 Ἀστὴρ βέβηλται δεινὴ γένυς, ὅς ῥα μάλιστα
 Ὀξία σειράει· καὶ μιν καλέουσ' ἄνθρωποι
 Σείριον· —————

As they seem at a loss how to explain the Word *σειράω*, it seems to argue the more that it was of foreign Original, and rightly interpreted by ἀστράπιω.

(e) For the Fable see the *Scholiast Didymus* on *Iliad* Σ. vers. 486, and *Eratoſthenes's Asterisms*. As to his Name, *Strabo* thinks he was called so from *Oreon*, a City of *Eubœa*; Δοκεῖ δὲ καὶ ὁ Ὀρίων ἐνταῦθα τραφεῖς, ὥτως ὀνομασθῆναι pag. 446. According to *Hesiod*, as quoted by the *Scholiast* on *Aratus*, he was said, Βρύλλης (Εὐρυάλης *Eratoſth. Asterism.*) τῆς Μίνω καὶ Ποσειδῶν εἶναι, δωρεάν δ' ἔχειν παρὰ τῷ Πατρὶς ἐπὶ τῶν κυμάτων
περὶ

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the three following ones, viz. *Arcturus* (f),
the

περέεσθαι pag. 43. If a Conjecture may be allowed, his being a Sailor and observing the Stars, might procure him the Name of Ὠρίγ Ori, from the Verb Ὠρίγ *evigilare, expergisci*, q. d. *the Watcher*, and, with a Greek Termination, *Orion*. The same Verb signifying in *Pibel excecavit*, gave occasion to fancy he was *struck blind*; and from the Ambiguity between this Verb and the Greek Ὠρίω, arose the Fiction concerning the Manner of his Begetting. *Malela* has a yet greater Fiction than all this; for he supposes, that *Nimrod* after his Death was translated to the Skies, and became the Constellation *Orion*. See *Cabmet on Job 9*.

(f) Or Ἀρκτοφύλαξ — δοκιᾷ γὰρ αὐτὴν φυλάττειν, says the *Scholiast* on *Aratus*, pag. 15. so that the Derivation is plainly Greek. The Greek Mythologists say, that *Callisto*, the Daughter of *Lycaon*, was transformed into a Bear by *Juno*, and under that Form killed by *Diana*, and after her Death made a Constellation by *Jupiter*. Τάυτῃ τῇ Καλλιστοῖ, says *Pausanias*, (λέγω δὲ τὰ λεγόμενα ὑπὸ Ἑλλήνων) συνεγένετο ἑρασθεὶς Ζεὺς. Ἡρα δὲ, ὡς, ἐφώρασεν ἐποίησεν ἄρκτον τὴν Καλλιστῶ. Ἀρτέμις δὲ ἐς χάριν τῆς Ἡρας κλειτόζευσεν αὐτήν. — Καλλιστῶ δὲ αὐτὴν ἐποίησεν (Ζεὺς) ἀστῆρας καλυμένην ἄρκιον μεγάλην ἥς καὶ Ὀμπερῶν Ὀδυσσεύς ἀνάπλω παρὰ Καλυψῆς μνήμην ἔχει,

Πληιάδας τ' ἰσορῶντα, καὶ ὀψὲ δύνοντα Βούτην,
Ἀρκίον θ', ἥν καὶ Ἀμαξαν ἐπικλήσιν καλέουσιν.
Ἐχουσιν δ' αὖ καὶ ἄλλως τὸ ὄνομα οἱ Ἀστέρες ἐπὶ
τιμῇ

the Pleiades (g), and the Hyades

M 2

des

τιμῇ τῇ Καλλιγῆς· ἐπεὶ τὰς γὰρ αὐτῆς ἀποφαί-
νωσι· οἱ Ἀρκάδες· pag. 238. This Fiction seems to
have taken Rise from the Ambiguity of the Word
ἀρκτεύεσθαι, which was applied to Virgins when, at
about ten Years of Age, they were dedicated to Dia-
na· Ἀρκτεύεσθαι δὲ τὰς παρθένους ἔλεγον ὁ δῆμος
ὁ Ἀττικὸς. Jul. Pollux. Lib. 5. § 81. And Cæ-
l. Rhodogin. pag. 731, says, *Id Verbum signat, Dia-
næ prius, quàm Tempus appetat Nuptiarum, Virgines
consecrari, initiariue. Quod Lysias scribit in Ora-
tione pro Phrynichi Filiâ. (Si tamen ex ejus illa pro-
diit Officinâ.) Decreto namque sancitum Atheniensium
erat, nequa Viro puella traderetur, εἰμὴ ἀρκτεύσειε τῇ
Δεῷ, id est, nisi sacra obiisset Dianæ. Induebantur
autem veste, quam Crocotam nominant, nec decimo Æ-
tatis Anno grandiores, nec quinto inferiores; iis autem
placari credebatur Diana, &c.* What Time the
Greeks began to give Names to the Stars is uncer-
tain; but Seneca says, *Nondum sunt Anni mille quin-
genti, ex quo Græcia*

— *Stellis Numeros & Nomina fecit.*

Nat. Quæst. c. 25.

Seneca flourished about 56 Years after Christ; reckon-
ing 1500 Years backward, will bring us to the Year
before Christ 1444, within which Time, according
to him, the Practice began among the Greeks.

(g) Καλῶνται δὲ αἱ Πλειάδες τῷ ὀνόματι τῷ τῷ,
ἀπὸ Πλειόνης τῆς αὐτῶν μητρὸς· ἢ ἀπὸ τῆς πελειᾶ-
δος

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des (b), the only Stars in his Catalogue besides, being apparently of Greek Formation. By the Name *Arcturus*, we may guess that the *Septem Triones* were in his Days known by the Name of the *Bear*, though he never mentions it. That the *Greeks* did not fail by it in his Time might seem probable from his Silence, where he has the fairest Opportunity of telling us, if they did so, had

οἱ γενέσθαι, Φευγέσας τὸν Ὠρίωνα· ἢ ἀπὸ τῶ ἐἰς πολλὰ χρησιμεύειν· σημαντικαὶ γὰρ καὶ θέρους, καὶ σπόρου· ἢ ὅτι πλησίον ἀλλήλων κεῖνται, παρὰ τοῦ λαίου γόνυ τῷ Περσείῳ· ἢ ὅτι χρήσιμοι εἰσι τοῖς πλέουσιν· — καλοῦντο δ' ἂν ἔτι Πλειάδες, καὶ ἀπὸ τῶ πολεῖν ἐκ περιόδου, καὶ συμπληρῶν τοῦ ἐνιαυτοῦ· ἀπὸ τούτων γὰρ κατ' ἐξοχὴν καὶ πλειῶν ἐκλήθη ὁ ἐνιαυτός· *Schol. on Arat. pag. 35.*

(b) Ἐκ τῶν δύο γραμμῶν τῶ ὕψους αἱ γὰρ ὑάδες τῆτο τὸ σοιχεῖον ἀπομιμνήμεναι, τὸ ταύρειον ἀποτελεῖσι πρόσωπον· τινὲς μὲν ἔν φασιν, ὅτι διὰ τῆτο ταύτας ὑάδας εἶπεν· οἱ δὲ, ὅτι δυόμεναι αἰτίαι ὑεῖν γίνονται· *Schol. on Arat. pag. 25.*

had not *Homer*, who is supposed to speak agreeable to the Custom of the Times about which he wrote, told us of *Ulysses*, that

— ἐδὲ οἱ ὕπνου ἐπὶ βλεφαίραισιν ἔπιπτε
Πηλεΐδης τ' ἐσορῶντι, καὶ ὄψε' ὀνόηα Βούτην,
Ἄρκτου θ', ἣν καὶ Ἀμαξάν ἐπὶ κλησιν καλέε-
σιν (i).

Thus much is certain, that the *Greeks* were in *Hesiod's* Time in some Sort acquainted with the *Tropics* and *Equinoxes*; I say in *some Sort*, because it can scarce be thought that their Knowledge was in any Degree accurate, as will appear, when we come to speak of much later Times.

How

(i) *Odysf. E. vers. 271.*

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How long *Homer* lived after *Hesiod* (*k*), if at all, is not agreed on; but it doth not appear from him, that the Catalogue of *Constellations* was enlarged in his Time. He has, besides those already mentioned, only *Bootes*, and the *Wain*; the former of which, according to *Suidas* (*l*), signifies sometimes the *whole Constellation*, and sometimes the *Star in the Girdle*; and the latter, as was observed just now, was probably known before. He, indeed,
is

(*k*) Περὶ δὲ Ἡσιόδου τὴν Ἡλικίαν καὶ Ὀμήρου πολυπραγμονήσαντι ἐς τὸ ἀκριβέστατον ἡμῶν γράφειν ἥδ' ἦν, ἐπισαμένῳ τὸ Φιλαίτιον ἄλλων τῶν καὶ ἄλλ' ἡκιστα ὅσοι κατ' ἡμῶν ἐπὶ ποιήσει τῶν ἐπῶν καθέστησαν. *Ραψαν*, pag. 304. But concerning the Age of *Hesiod* and *Homer*, see more hereafter.

(*l*) Ἀρκτῦρ δὲ λέγεται καὶ αὐτὸς ὅλος ὁ Βοώτης, ἰδίως δὲ καὶ ὁ ὑπὸ τὴν ζώνην αὐτοῦ ἀστὴρ, λέγεται καὶ Ἀρκτοφύλαξ. *Suid. in voc. Ἀρκτος*. And so *Theop* likewise, "Ἐνα δ' ἔχει ἐν μέσῃ ζώνῃ (*Arctophylax*) ὃς τις διὰ τὴν ὑπερβολὴν τῆς λαμπρότητος ἰδίως καὶ αὐτὸς λέγεται ἀρκτῦρ, ὁμοίως τῷ παντὶ Ἀρκτέρῳ. *on Arat. pag. 15*.

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is the first Writer among the Greeks that mentions *Hesperus*,

— ὃς κάλλιστος ἐν ἑρῶν ἴσεται ἀστὴρ (m).

BUT, whether this was reckoned amongst the fix'd Stars, or not, at this Time, is uncertain; its *Theory*, in all Probability, was not adjusted in any

(m) *Iliad* χ. vers. 318. So *Apollon.* compares *Pollux*,

— ὃ δ' ἑρῶν ἀτάλαντος
Ἄστὴρ Τυνδαρίδης, ἕπερ κάλλισται ἴασσιν
Ἑσπερίην δὲ νύκτα Φαινομένην ἀμαρυγαί·
Argonaut. lib. 2. vers. 40.

Hesperus, according to *Diodorus Siculus*, was Brother to *Atlas*, Κατὰ γὰρ τὴν Ἑσπερίτιν ὀνομαζομένην χώραν Φασὶν ἀδελφὺς δύο γενέσθαι δόξῃ διωνομασμένους, Ἑσπερον καὶ Ἀτλαντα. And, as a Reward to *Hercules*, he says, for restoring his Daughter, τὸν Ἀτλάντα μὴ μόνον δύναι τὰ πρὸς τὸν ἄθλον καθήκοντα προθύμως, ἀλλὰ καὶ τὰ κατὰ τὴν ἀστρολογίαν ἀφθόνης διδάξαι. — Παραπλησίως δὲ καὶ τῷ Ἡρακλῆϊ ἐξενέγκαντος εἰς τῆς Ἑλληνικῆς τὸν σφαιρικὸν λόγον, δόξης μεγάλης τυχεῖν, ὡς διαδίδεγμῶν τὸν Ἀτλάντειον κόσμον pag. 234.

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any Sort, before *Pythagoras's* Days (*n*).
Be that as it will, it seems as if in
Homer's Time, no *Constellation* had been
formed to the Northward of the *Great*
Bear, by his saying, that

*ΟΙΗ δ' ἄμμορος ἐστὶ λοεῖρῶν ὠκεανόιο (ο).

As to the *Lesser Wain*, its Invention is
generally attributed to *Thales* (*p*), the
next Person that we hear of, as treating
upon *Astronomical* Subjects, and from
whose Time, indeed, we may properly
date

(*n*) See hereafter, Note (*q*).

(ο) *Iliad* Σ. vers. 489. *Οιη ἀντὶ τῷ μόνῃ (says
the Scholiast) ἔ δύνει εἰς τὸν ὠκεανόν· αἱ γὰρ
ἄρκτοι ἔ δύνουσιν, ἔσαι ἐν τῷ αἰεὶ Φανερῷ.

(*p*) — ἡ Κυνόσουρα καλυμένη — ἥς *Ομήρῳ
ἔ μέμνηται, ὡς ὕστερον εὐρεθείσης ὑπὸ Θαλῷ τῷ Μί-
λεσίῳ, ἐνὸς τῶν ἐπὶ τὰ σοφῶν. Schol. on *Iliad* Σ. vers.
487. And so *Diog. Laert.* Καλλίμαχῳ δ' αὐτὸν
εἶδεν εὐρετὴν τῆς Ἀρκτὸς τῆς μικρᾶς, λέγων ἐν τοῖς
Ἰάμβοις ὕτως,

Καὶ τῆς ἀμάξης ἐλέγετο σταθμήσασθαι
Τὴν Ἀστερίσκου, ἥ πλένσι Φοίνικες·

Vit. Thal.

date all that truly deserves that Name. He was the first *Greek* that went to *Egypt* (q) for Improvement, which would incline one to think, that it was but about this Time, that that Country began to be famous for *Science*. He is said, by *Hieronymus* in *Diogenes Laertius* (r), to have himself discovered the Year to consist of 365 Days, though *Strabo* (s) ascribes this to the *Egyptians*. They might, indeed, be both reconciled together, by supposing that *Thales* borrowed it from the *Egyptians*,

N

could

(q) Θαλῆς δὲ πρῶτον εἰς Ἀιγυπτὸν ἐλθὼν μετήγαγεν εἰς τὴν Ἑλλάδα τὴν θεωρίαν ταύτην. *Proclus in Euclid. lib. 2. pag. 19. Thales enim, qui diligenter de his Rebus exquisivit, & hanc primus Arcton appellavit, Natione fuit Phoenix, ut Herodotus Milefius dicit. Igitur omnes qui Peloponnesum incolunt, priore utuntur Arcto: Phœnices autem quam à suo Inventore acceperunt observant, & hanc studiosius perspicendo, diligentius navigare existimantur, & verè eam ab Inventoris Genere Phœnicen appellant.* Hygin. Astron. Poet. lib. 2.

(r) Τὰς τε ὥρας τῷ ἐνιαυτῷ Φασὶν αὐτὸν εὗρεῖν, καὶ εἰς τριακοσίας ἐξήκοντα πέντε ἡμέρας διελεῖν.

(s) See Note (i) above.

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Its <i>Declination</i>	13° 43' 00"
Its <i>Right Ascension</i>	22° 24' 00"
<i>Oblique Descension</i>	32° 59' 56"
The Point of the <i>Ecliptic</i> } setting with it	8 26° 48' 52"
The Point opposite to } which is	♍ 26° 48' 52"

The Place of the *Sun* for that Time:
That is, the *Pleiades* set *Cosmically* the
Year that *Thales* died, when the *Sun*
was in 26° 48' 52" of *Scorpio*. But
the Place of the *Autumnal Intersection*
that Year was in ♈ 29° 50' 24", from
whence to *Scorpio* 26° 48' 52" is 26°
58' 28", or nearly 27°, which gives in
Time nearly 27^d 8^h 45'. Which,
though as near the Determination of
Thales as can be expected from the
Words of *Pliny*, yet shews the Rude-
ness of Observation in those Days, and
hardly allows us to suppose the true
Time of the *Equinox* to be known,
nor

nor consequently the true Quantity of the *Tropical Year*.

BUT, how then (may some say) was it possible for him to foretel an *Eclipse* of the *Sun*, as *Herodotus* (*y*) says he did? A Question, indeed, not easy

(*y*) Τῷ ἐκλῖω ἔτει συμβολῆς γενομένης, συνήνειξε ὥς τε τῆς μάχης συνεσεώσης, τὴν ἡμέρην ἑξαπύνης νύκτα γενέσθαι· τὴν δὲ μεταλλαγὴν ταύτην τῆς ἡμέρης Θαλῆς ὁ Μιλήσιος τοῖς Ἴωσι προηγόρευσε ἕσεσθαι, ΟΥΡΟΝ ΠΡΟΘΕΜΕΝΟΣ ΕΝΙΑΥΤΟΝ ΤΟΥΤΟΝ ΕΝ Ω ΔΗ ΚΑΙ ΕΓΕΝΕΤΟ Η ΜΕΤΑΒΟΛΗ· pag. 29. The Time when this *Eclipse* happened is not at all agreed on by Authors. *Pliny*, lib. 2. c. 12. places it in the 4th Year of the 48th *Olympiad*, 170 Years after the Building of *Rome*. *Solinus*, cap. 20. in the 4th *Olympiad*, in the 604th Year after the Taking of *Troy*. *Clemens Alexandrinus*, from *Eudemus*, pag. 221, about the 50th *Olympiad*, when *Cyaxares*, Father of *Astyages*, reigned in *Media*; *Alyattes*, Father of *Cræsus*, in *Lydia*. *Eusebius*, in the 2d Year of the 48th *Olympiad*. *Ricciolus Almag. Nov. Tom. 1. pag. 363*, places it in the 585th Year before *Christ*, *May* the 28th, about 6 in the Afternoon, *Digits* eclipsed 12. 56. *Lansbergius*, in the 3d Year of the 48th *Olympiad*. *Ann. Nabon. 163, Tybi* the 13th, or *May* the 28th, *Digits*

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easy to be resolved, as we know not by what Method he did so. That he could pretend to be accurate in the Time when it would happen, or indeed was so, is more than we have Reason to think, from the very Account itself. To predict an *Eclipse*, of the *Sun* especially, is a Work of Labour and Difficulty; and required better Tables than, it is to be feared, *Thales* was furnished with.

When

gits eclipsed 12. 20. in *Hellepont*; but only 10. 12. at *Alexandria*. Sir *Isaac Newton*, *Chron. pag. 316*, May the 28th. Archbishop *Usher* places it in the Reign of *Cyaxares*, in the 4th Year of the 44th *Olympiad*, *Ann. Nabon. 147*, the 4th of *Pachon*, or, according to the *Julian Account*, Sunday, September the 20th, beginning 1^h 3' 25" after Sun-rise, *Digits* eclipsed 9, Duration almost 2^h. *Petavius* places it in the 4th Year of the 45th *Olympiad*, *Ann. Period. Jul. 4117*, and 597 before *Christ*, 157 after the Building of *Rome*, *Wed. July* the 9th, after Midnight 4^h 45', *Digits* eclipsed 9. 22. Duration full 2^h. But *Rocca* confutes *Petavius*, because, as he says, that *Eclipse* suits not with the Circumstances of the History, beginning too early in the Morning, and being defective as to the Quantity in *Pontus* and *Asia Minor*. *Kepler*, *Scaliger*, *Buntingus*, and *Salianus* follow *Pliny*. *Buntingus* makes the *Digits* eclipsed 11. 30.

When I say *better Tables*, it is only on the Supposition that he had any at all: For, as seems to be most probable, and in which I find others likewise concur with me, he rather collected it only by attending to the *Chaldean Saros*; a Period consisting of 223 *Lunations* (*z*), after which Time the *Eclipses* of the *Sun* and *Moon* return in the same Order again (*a*). The Truth is, we are apt to speak and think of former Times in the
 Stile

(*) *Vetres Græci Scriptores* Thaletem Milesium omnium Græcorum primum Solis aliquam Eclipsin præ-nunciare idoneum fuisse — animadvertunt; atque ex-inde, vel ad supputandas Eclipses, tunc Temporis Philosophis Tabulas fuisse, vel quod probabilius est, Thaletem à Chaldæorum S A R O N E supradicto, istam Supputationem investigasse, colligitur. Flamst. Hist. Cœlest. Brit. Tom. 3. pag. 7.

(a) Defectus ducentis viginti duobus Mensibus redire in suos Orbes certum est, says Pliny, Nat. Hist. lib. 2. cap. 13. Σαρὸς, says Hesychius, ἀριθμὸς τῆς ταραξὶς Βαβυλωνίως. In the Chaldee and Syriac Languages, שָׂרָא, Sara, signifies not only solvit, dissolvit, absolvit, but likewise cœpit, incepit, inchoavit; from whence the Chaldee שְׂרִיאָא, and the Syriac
 ܫܪܝܐ, Initium, Principium.

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Stile and Manner of our own; and, because we know *Eclipses* can now be calculated pretty exactly, the Imagination is apt to suggest the same with regard to that of *Thales*, and that he told them the very *Day* and *Hour* when it would happen; whereas from *Herodotus* it seems, that he only confined himself to its falling out within the Compass of that Year; a Thing, no doubt, that was at that Time looked upon as a very extraordinary Degree of Knowledge. How little the Doctrine of *Eclipses*, however, was understood long after this, appears from hence, that, in the 19th Year of the *Peloponnesian War*, *Ignarus causæ*, says *Pliny* (b), *Nicias*, *Atheni-*

(b) *Nat. Histor. lib. 2. cap. 12.* About the same Time, likewise, we find *Athens* in deep Concern at a *Solar Eclipse*. *Cum obscurato repente Sole, inusitatis perfusæ Tenebris Athenæ Solitudine agerentur, interitum sibi cælesti Denunciatione portendi credentes; Pericles processit in medium, & quæ à Preceptore suo Anaxagora pertinentia ad Solis & Lunæ Cursum acceperat,*
disse-

Atheniensium Imperator, veritus Classē
portu educere, Opes eorum afflixit. For
as every Thing was ready, and they

O

were

differuit. Valer. Max. lib. 8. cap. 11. How little
the Doctrine of Eclipses was understood at this
Time, appears from a pretty remarkable Passage
in Plutarch's Life of Nicias; where, speaking of
the Eclipse that so terrified that Commander, he
says, that Solar Eclipses were, in some sort, common-
ly known at that Time to be caused by the Interpo-
sition of the Moon.

Ἀυτὴν δὲ τὴν Σελήνην ὡς τίνι
τυγχάνουσαν, καὶ πῶς αἰφνιδίου ἐκ πανσελήνης τὸ φῶς
ἀπόλλυσι, καὶ χροᾶς ἴησι παύδοσιν, καὶ ῥᾶδιον ἦν
καταλαβεῖν, ἀλλ' ἀλλόχολον ἡγήσατο, καὶ πρὸς συμ-
φορῶν τινῶν μεγάλων, ἐκ θεῶν γινόμενον σημεῖον.
Ὁ γὰρ πρῶτος σαφέστατον γε πάντων καὶ θαρρα-
λεώτατον, περὶ Σελήνης κατεργασμῶν καὶ σκιάς, λό-
γον εἰς γραφὴν καταθέμενος Ἀναξαγόρας, ὅτι
αὐτὸς ἦν παλαιός, ὅτε ὁ λόγος ἐνδοξε, ἀλλ'
ἀπόρρητος ἔτι, καὶ δι' ὀλίγων καὶ μετ' εὐλαβείας
τινὸς ἢ ΠΙΣΤΕΩΣ βαδίζων. And the Reason
he gives is observable, Οὐ γὰρ ἡνείχοντο τὰς φυ-
σικὰς καὶ μετεωρολογίας τότε καταμένους, ὥς εἰς
αἰτίας ἀλόγους, καὶ δυνάμεις ἀπρονοήτους, καὶ κατη-
ναγκασμένα πάθη, διατρέχουσας τὸ θεῖον. From
this Time, however, it seems as if the Greeks ap-
plied themselves in earnest to the Study of Eclipses,
when Ὅψι δ' ἡ Πλάτωνος ἐκλάμπασα δόξα, (says
he) διὰ τὸν βίον τοῦ ἀνδρός, καὶ ὅτι ταῖς θεαίαις

καὶ

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were upon the Point of sailing, says *Thucydides* (c), the Moon became eclipsed, for she was then at the Full; upon which most of the Athenians, looking upon the Thing as ominous, persuaded the Generals to stop. Nicias too, (being himself

καὶ κυριωτέrais ἀρχαῖς ὑπέταξε τὰς Φυσικὰς ἀνάγκας, ἀφείλε τὴν τῶν λόγων τέτων διαβολήν, καὶ τοῖς μαθημασιν εἰς ἅπαντας ὁδὸν ἐνέδεικνεν· ὁ γὰρ ἑταῖρος αὐτοῦ Δίων, καθ' οὗ χρόνον ἔμελλεν ἄρας ἐκ Ζακύνθου, πλεῖν ἐπὶ Διονυσίου, ἐκλειψέσης τῆς Σελήνης, ὅθεν διαπραχθεὶς ἀνέχθη·

(c) Καὶ μελλόντων αὐτῶν, ἐπειδὴ ἔτοιμα ἦν ἀποπλεῖν, ἡ Σελήνη ἐκλείπει· ἐτύγχανε γὰρ παν-
 εῖλητο ἡ ἡμέρα. καὶ οἱ Ἀθηναῖοι οἱ τε πλείους ἐπισ-
 χεῖν ἐκίλευον τὰς Στρατηγὰς, ἐνθύμιον ποίεσθαι·
 καὶ ὁ Νικίας (ἦν γὰρ τι καὶ ἄγαν θείας μὲν τι καὶ
 τῷ τοιούτῳ προσκειμένη) ἐδ' αὖ διαβουλεύσασθαι
 ἐτι ἔφη, πρὶν ἅς οἱ Μάντις ἐξηγῶντο, τρεῖς ἡμέρας
 μεῖναι, ὅπως αὖ πρότερον κινήσειν. *Pag.*
478. Edit. Waff. Though the Greek has τρεῖς ἡμέρας,
 yet, as some Copies have τρεῖς, Mr. Dodwell observes,
 from the Circumstances of the History, and from
Plutarch and *Diodorus*, that the Word ἡμέρας must be
 an Interpolation. *Scaliger, lib. 1. pag. 56.* places
 this Eclipse, August the 27th. *Petavius* adds, that
 at Syracuse it was Afternoon 10^h 11', Digits eclipsed
 13; Duration 3^h 28'; total Darkness 41'.
See Ricciol. Almag. Nov. Tom. 1. pag. 364.

himself much addicted to Prodigies and the like) said, they should not think of stirring 'till the twenty-seven Days were past, which the Augurs had ordered them to stay.

THIS same Philosopher, if Plutarch (d) and Stobæus (e) say true, taught, that the Celestial Sphere was divided into five Circles, or Zones; one of which is the Arctic, and always in our View; the next the Summer Tropic; then the Equinoctial; the next the Winter Tropic; and last of all the

O 2 Antartic,

(d) Θαλῆς, Πυθαγόρας, οἱ ἀπ' αὐτῶ, μεμερίσθαι τὴν τῷ παντὶ οὐρανῷ σφαῖραν εἰς κύκλους πέντε, ὥς τινὰς προσαγορεύουσι ζώνας· καλεῖται δὲ ὁ μὲν αὐτῶν, ἀρκτικός τε καὶ ἀειφανής· ὁ δὲ, θερινὸς τροπικός, ὁ δὲ, ἰσημερινός, ὁ δὲ, χειμερινός τροπικός, ὁ δὲ, ἀνταρκτικός τε καὶ ἀφανής· λοξὸς δὲ τοῖς τρισὶ μέσοις ὁ καλόμενος ζωδιακός ὑποβέβηται, παρῆπιψαύων τῶν μέσων τριῶν· πάντας δὲ αὐτὰς, ὁ μεσημερινός πρὸς ὀρθὰς ἀπὸ τῶν ἀρκίων ἐπὶ τὸ ἀντίξυν τέμνει· *De Placit. Philos. lib. 2. cap. 12.*

(e) *Phys. Eclog. lib. 1. cap. 25.*

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Antartic, never seen by us. The oblique Circle, called the Zodiac, he said, lay under the three middle Circles, and touched them all; and that they were all cut at Right Angles by the Meridian, that goes from Pole to Pole: An Account, that may be reasonably enough disputed, as it is hardly probable, that the Heavens were so accurately marked out by Lines and Circles, in this Infancy of *Astronomy*. Much more probable is what *Strabo* (f) informs us, that the *Terrestrial Zones* were the Invention of *Parmenides*, who flourished in the sixty-ninth *Olympiad*; about 500 Years before *Christ*, and 49 after the Death of *Thales*; and it may, I think, be fairly presumed, that the

Celestial

(f) Page 94. And so *Achilles Tatius* tells us, Πρῶτος δὲ Παρμενίδης περὶ τῶν Ζωνῶν ἐκίνησε λόγον. *ad Arat. Phænom. pag. 157.* Where he likewise adds, that they were not always made of the same Number, *Polybius* and *Possidonius* dividing the *Torrid Zone* into two Parts, and so making six; but *Eratosthenes*, and others, reckoned only five.

Celestial Zones were not introduced 'till afterwards. If *Laertius* may be credited, *Thales* affirmed, that *Water* was the Original of all Things, and that the Sun was the 720th Part of the Moon's Bigness (g). But this, to be sure, must be either a Mistake of *Laertius* himself, or his Transcribers; for, if *Thales* knew the Cause of an Eclipse, he must know, that the Sun was bigger than the Moon. *Stanley* therefore, in the Life of that Philosopher, imagines, and with great Probability, that, instead of Σεληναίς, it should be read Ζωδιακῆ; and the Meaning to be, that the Sun's apparent Diameter is the 720th Part of his annual Orbit; the same Proportion, as he observes from *Archimedes's Arenarius*,

(g) Ἀρχὴν δὲ τῶν Πάντων ὕδωρ ὑπεσῆσατο.
 — Πρῶτ' τὸ τῆ ἡλίου μέγεθος τῆ Σεληναίης ἐπιλα-
 χοσιοςὸν καὶ εἰκοσὸν μέρος ἀπεφῆνατο, κατὰ τίνος.
Vit. Thalet. The *Amsterdam* Edition, 1692, leaves out μέρος; and *Causabon* reads, πρὸς τὸ τῆ ἡλίου μέγεθος, τὸ, &c.

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rius, that is assigned it by *Aristarchus* (b).

ACCORD

(b) Τὸτο δὲ ὑποτίθηται Ἀριστάρχῳ μὲν ἐρηκ-
 τῷ, τὸ κύκλῳ τῆς ζώδιον τῶν ἄλλων Φαιδίου
 δὲ τὸ ἰσάμεν καὶ ἐν ἡλικίᾳ τῶν pag. 13. Others,
 again, give other Measures; some comparing him
 with his own annual Orbit, and others with a great
 Circle of the Earth, and thence with the Earth itself.
 See *Achilles Tatius*, pag. 140. Sol quidem quanto mi-
 nor sit Circo proprio deprehensum est. Manifestissimis
 enim Dimensionum Rationibus constat, Mensuram Solis
 ducentiesimam sextam decimam Partem habere Magni-
 tudinis Circi, per quam Sol ipse discerit, *Macrobius* lib. 1.
 cap. 16. Again, cap. 20. *Eratosthenes*, in *Libris Di-*
dimensionum, sic ait, Mensura Terræ, septies et vicies
 multiplicata, Mensura Solis efficiet. *Pellidonius* dicit,
 multa multoque sæpius multiplicataque, Solis Spatium effi-
 cere; Et uterque lunaris defectus Argumentum pro se advo-
 cat. Without regarding any Eclipses of the Moon, the
 Egyptians, if *Macrobius* may be believed, (*ibid.*) ni-
 hil ad conjecturam loquentes, sequestrata ac libero Argu-
 mento, determined the Sun's Magnitude in this Man-
 ner. The Diameter of a Circle is to the Circumfe-
 rence, said they, as $1 : 3 \frac{1}{2}$, or as $7 : 22$. The
 Length of the Earth's Shadow = 60 Diameters of
 the Earth. A great Circle of the Earth = 252,000
 Stadia, whence, by saying $22 : 7 :: 252,000 : \text{a fourth}$
 Number, the Diameter of the Earth will be found
 to

ACCORDING to this Way of reckoning

to be 80,181 $\frac{1}{4}$; or, as *Macrobius* makes it less accurately, 80,000, and something more; therefore the Height of the Earth's Shadow will be 4,800,000 *Stadia*, which multiplied again by 2, gives 9,600,000 *Stadia*, the Diameter of the *Sun's* annual Orbit; and from the Proportion above 7 : 22 : the Circumference will be found to be 3,171,428 $\frac{4}{5}$, or, as he makes it, 3,170,000. They then observed on the Day of the *Equinox*, by Means of a Stile fixed perpendicular in a hollow Sphere, placed truly horizontal, the Place on the Edge where the Shadow of the Stile fell, as soon as ever the *Sun* appeared in the Morning, and where it fell likewise in the Evening, the Moment that his lower Limb touched the *Horizon* at Setting. They then found, by measuring the Distance of this Point from the Edge, and taking the Difference of this and the former Distance, that it was $\frac{1}{3}$ of the Arch that the Shadow described in an Hour. Since, then, the Arch of one Hour contained 9 of these, an *Equinoctial* Day of 12 Hours must contain 108 of these Arches; and therefore, the Line before found they concluded must be the $\frac{1}{108}$ Part of the Semi-circle, described by the Shadow of the Stile in the Sphere; and, by similar Arches, the Diameter of the *Sun* to be the $\frac{1}{108}$ Part of his Semi-orbit, or the $\frac{1}{216}$ Part of the Whole. But the *Sun's* Orbit was before found to contain 3,170,000 *Stadia*,

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oning (i), it seems, the *Sun's apparent Diameter* was made 30'. Later Observations (k) make it, when least, 31' 40", and when biggest, 32' 47"; which

Stadia, which divided by 216, gives 146,750 $\frac{2}{3}$ *Stadia*, or, in round Numbers, 140,000. Therefore the *Sun's Diameter* was determined to be 140,000 *Stadia*, almost double the Diameter of the Earth. Since, then, the Diameter of the *Sun* is to the Diameter of the Earth :: 2 : 1 : nearly, and Spheres are as the Cubes of their Diameters, they determined the Proportion of the *Sun* to the Earth to be as 8 : 1. But, by modern Observations, it is found, that the Diameter of the *Sun* is above 95 Times the Diameter of the Earth; and therefore the *Sun* will be above 857,375 Times the Bigness of the Earth. The Reason of this wide Difference is owing to the Inaccuracy of Observation, and the supposing that the Shadow of the Earth reaches as far as the Orbit of the *Sun*; the Earth being likewise made the Centre of the *Sun's* Motion; neither of which are true.

(i) For in 360 Degrees are 21,600 Minutes; which divided by 720, give 30'.

(k) *Keil's Astronomical Lectures*, pag. 82. *Gassendus*, in his *Life of Peiresc*, says, *Solem esse Diametro, apogeiū quidem, minorum primorum triginta, secundorum duodecim; perigeiū vero, primorum triginta unius, secundorum sex.* pag. 451.

which, though it would make a considerable Difference in a Calculation, yet was a Degree of Exactness that shews the prodigious Skill of that enterprising People, and seems to bespeak later Times than even those of *Thales*.

AND here, before we proceed any farther, we may take notice of another Argument, that shews the little Probability of this Philosopher's being acquainted with the true Length of the Year, since we find *Solon*, his Friend and Contemporary, so apparently mistaken in the Point. "I make
" the Bounds of Man's Life, says that
" *Wise Man* (1) to *Cræsus*, LXX Years.
" These LXX Years, without the inter-
P " calary

(1) Ἐς γὰρ ἑβδομήκοντα ἔτεα ὕρον τῆς ζῆς
ἀνθρώπων προτίθημι· ὅτοι εἶντες ἐνιαυτοὶ ἑβδομή-
κοντα, παρέχουσι ἡμέρας διηκοσίας καὶ πεντακισχι-
λίας καὶ διαμυρίας, ἐμβολίμῳ μηνὶ μὴ γενομένῳ
ἔε

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" calary Month, make 25,200 Days,
 " (i. e. 360 + 70.) But, should one
 " add every other Year an intercalary
 " Month, in order to rectify the Sea-
 " fons, the Number of intercalary
 " Months in LXX Years will amount
 " to ($\frac{70}{2} =$) 35, and the Days in
 " these Months to (35 + 30) 1050.
 " So that all the Days in LXX Years,
 " after this Way of Computation, will
 " amount to (25,200 + 1050 =)
 " 26,250." If then we divide this
 Sum by 70, we shall find the Year to
 consist of 375 Days, exceeding the
 Course of the Sun by 9^d 18^h 11'; and
 dividing the other Sum 25,200 by 70
 gives 360, the Days in the old Year,
 and

ἐῖς δὲ δὴ ἐβελήσει τῷτερον τῶν ἐτέων μηνὶ μακρό-
 τερον γίνεσθαι, ἵνα δὴ αἱ ὥραι συμβαίνωσι παρα-
 γινόμεναι ἐς τὸ δέον, μῆνες μὲν παρὰ τὰ ἑβδομή-
 κοντα ἕτεα οἱ ἐμβόλιμοι γίνονται τριήκοντα πέντε·
 ἡμέραι δὲ ἐκ τῶν μηνῶν τούτων, χίλιας πενήκοντα·
 τῶν τῶν ἀπασέων ἡμερέων τῶν ἐς τὰ ἑβδομή-
 κοντα ἕτεα, ἐνσέων πενήκοντα καὶ διηκοσίων καὶ ἑξα-
 κισχιλίων καὶ δισμυρίων. pag. 13.

and short of the true Motion of the Sun by $5^d 5^h 49'$. And that this was the Form of the Year at that Time, appears farther from this Enigma of *Cleobulus* (*m*), an Intimate of *Solon's* :

Εἷς ὁ πάληρ, παῖδες δὲ δώδεκα· τῶν δὲ
 ἑκαστῶ
 Παῖδες τριήκοντα διάνδιχα εἶδ' ἔχουσαι
 Αἱ μὲν λευκαὶ ἔασιν ἰδεῖν, αἱ δ' αὖτε μέ-
 λαιναι
 Ἀθάνατοι δὲ τε ἔσται, ἀποφθινύουσι ἅπασαι.

And that this continued likewise to be the Form, 279 Years after the Death of *Thales*, appears from hence, that the *Athenians* erected 360 Statues to *Demetrius Phalereus*, answering the Days of the Year, *Nondum Anno hunc Numerum Dierum excedente*, says *Pliny* (*n*). It is true indeed, they used a

P 2

Variety

(*m*) *Diog. Laert. pag. 56.*

(*n*) *Nat. Hist. lib 34. cap. 6.*

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Variety of Corrections, by different Intercalations during this Time, so that *Callippus Cyzicenus* (o), a Contemporary of this *Demetrius*, made the Year to consist of 365 Days and $\frac{1}{4}$, having learnt these six Hours from *Eudoxus* before.

THE Scholar and Successor of *Thales* was *Anaximander*, whose Philosophy was, That the Earth was the Center of the World, and of a Spherical Figure; that the Moon borrowed her

(o) *Censorinus, de Die Nat. pag. 115*, says only 365. But *Geminus*, more exactly, says, 'Οι περί Καλλίππου γινόμεναι ἀστρολόγῃ διωρθώσαντα τὸ πλεονάζον τῆς ἡμέρας, καὶ συνετήσαντο τὴν ἐκκαίδομηκονταετηρίδα, συνετηκυῖαν ἐκ τεσσάρων ἑνεακαίδεκαετηρίδων, αἱ τινες περιέχουσι μῆνας μὲν $\Theta\mu'$, αἱ ἐμβόλιμοι ΚΗ , ἡμερῶν δὲ διςμυρίων $\zeta\psi\theta$. *Callippus cum suis correxerunt Excessum Diei, & constituerunt Periodum 76 Annorum, constantem ex quatuor decennovennalibus, quæ continent Menses quidem 940, è quibus, intercalares 28, Dies vero 27,759. Apud Petav. Uranolog. pag. 38. This last Number 27,759, divided by 76, the Years of the Callippic Period, gives 365 $\frac{1}{4}$.*

her Light from the Sun; and that the Sun was not less than the Earth, unless Laertius (p) be mistaken. With regard to the former of these Articles, it is certain Plutarch (q) asserts the Reverse, and that his Opinion was, that she had a Light of her own; but which, indeed, is the least probable of the two. He is said to have invented the Gnomon (r), i. e. it may be, introduced the Knowledge of it into Greece; it being, as observed before (s), of *Babylonish* Original; or he might be the first, perhaps, that applied it to the Marking the Tropics and Equinoxes, as it is said he did. This could not be much sooner,

(p) Μίσην τὴν Γῆν κείσθαι κέντρον τάξι ἐπέχουσιν, ἔσαν σφαιροειδῆ· τὴν τὲ Σελήνην ψευδοφαῖν, καὶ ἀπὸ ἡλίου φωτίζεσθαι· ἀλλὰ καὶ τὸν ἥλιον ἐκ ἐλάττωα τῆς γῆς. *In Vit. ejus.*

(q) *De Placit. Philosoph. lib. 2. cap. 28.*

(r) *Suidas in voc.* Ἡλιοτρόπιον· Ἡλιοτρόπιον, says he, Ὀρολογεῖον, Γνώμων ἐστὶ τὸ ἐν τοῖς Ἡλιοτροπίοις πηγνύμενον, ὃ περ Ἐφεῦρεν Ἀναξίμανδρος, καὶ ἔφησεν ἐπὶ τῶν Σκιοθήρων.

(s) See above, Note (c).

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sooner, according to *Laertius*, than the 58th Olympiad, *Ann. Per. Jul.* 4166, or 547 Years before *Christ*; and shews, with how little Accuracy the *Tropics* could be known in *Hesiod's* Time; unless, as there are good Grounds to suspect, even *Homer* and *Hesiod* themselves, are not to be placed beyond these Times. This same *Anaximander* is, by *Pliny* (t), said to have first discovered the *Obliquity of the Ecliptic*, though *Dionysius Periegetes* (u) makes it an Invention of the *Egyptians*:

Πρῶτος

(t) *Obliquitatem ejus intellexisse, hoc est Rerum Fores aperuisse, Anaximander Milefius traditur primus, Olympiade quinquagesima octava, lib. 2. cap. 8. Stobæus makes this the Invention of Pythagoras, and adds, that Oenopides Chius likewise claimed it for his. Πυθαγόρας πρῶτος ἐπινενοηκέναι λέγειναι τὴν λόξασιν τῷ Ζωδιακῷ κύκλῳ· ἢν τινα Ὀιονοπίδης ὁ Χῖος ὡς ἰδίαν ἐπίνοιαν σφειερίζεται. Lib. i. Phys. Eclog. cap. 25. Which are the very Words likewise of Plutarch de Placit. Philos. lib. 2. cap. 12.*

(u) *Irf.* 237.

amongst the Antients. III

Πρῶτοι δὲ γραμμῇσι πόλον διμερήσαντο,
Θυμῷ φρασσάμενοι λοξὸν δρόμον ἡλίου·

*They first with Circles mark'd the
Shining Sphere,
And first observ'd, thro' all the sliding
Year,
The Sun's bright Car its oblique
Journey steer.*

It is certain, as was said above,
that in *Hesiod's* Time the *Tropics*, and
therefore the *Declination* of the *Sun*,
was in some sort known; but the
Quantity of it could only be deter-
mined by some such Method as this:

The Height of the Pole at
Afcra, where Hesiod } $37^{\circ} 40' 00''$
lived, is
The Sun's Meridian Alti-
tude, the Day of the Sum- } $75^{\circ} 49' 00''$
mer Solstice,

The

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The same, the Day of the	} 28° 51' 00"
<i>Winter Solstice,</i>	
The longest Day,	14° 36' 40"
The shortest Day,	9° 23' 20"

The Difference, 5° 13' 20", is too considerable, not to have been taken notice of: But whether it was known in that Age, in what Manner this was occasioned, may admit of some Doubt; indeed it could not, if *Anaximander* was the first that discovered the apparent annual Course of the *Sun* to lie oblique to the *Equinoctial*; and *Hesiod* lived so much earlier than *Anaximander*, as some have supposed. That the Angle of this Obliquity was 23° 51' 20", the largest that it has been made (*x*),

was

(*x*) Whether the Angle of the *Ecliptic* with the *Equinoctial* has always been the same, or not, is a Question amongst Astronomers. What it has been made by *Eratoſthenes*, *Ptolemy*, *Albategnius*, and others, may be ſeen in *Snellius's Obſervat. Haſſiac.* pag. 93. At *Marſeilles*, *Pytheas*, who lived ſome Time

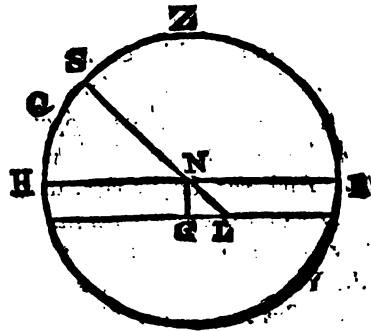
was only determined, perhaps, after they came to compare the different Lengths

Time about the Age of *Alexander the Great*, observed the Height of the Sun on the Day of the *Summer Solstice*, as we are informed by *Cleomedes Cycl. Theor. lib. 1. cap. 7.* *Hipparchus*, in *Strabo, lib. 2. pag. 78.* says, that, at *Bizantium*, the Proportion of the Stile to the Shadow is the same that *Pytheas* found it at *Marseilles*. And, *pag. 82.* he says, that, at *Bizantium*, on the Day of the *Summer Solstice*, the Stile is to the Shadow as 120 to 42 $\frac{1}{2}$:: 120 : 41 $\frac{1}{3}$:: 600 : 209. In the Year 1636, *Gassendus*, at the same Place, took the Sun's Meridian Altitude, on the Day of the *Solstice*, and found (he says) *Reductione factâ ad Numeros eosdem, quos usurpavit Pytheas (qui in Partes plusquam sexcentas divisum Gnomonem non habuit) fuisse, ex nostrâ Observatione, Gnomonem ad Umbram, ea Proportione, quam habent centum viginti ad quadraginta duo cum tribus quintis : qui fuit, juxta illud, ea Proportione quam habent centum viginti ad quadraginta unum cum quatuor quintis.* *Vit. Peiresc. pag. 468.* It may be observed here, that *Marseilles* and *Constantinople* are supposed to lie in the same Parallel of Latitude ; whereas more modern Observations make the former of these to lie in 43° 15', and the latter in 41° 40' Degrees North Latitude. *Ptolemy, in Hudf. Geog. Minor. vol. 3. pag. 17,* places *Bizantium* in 43° 5' ; unless it be a Mistake, the Greek being $\mu\gamma$ β' 43° 12'. According to these several Numbers,

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Lengths of the *Solstitial* and *Equinoctial* Shadows

Numbers we shall have different Declinations of the *Ecliptic*, as will be easily seen by the Scheme annexed.



Where let H R be the *Horizon* ; G N a *Gnomon* ; G L the Length of the Shadow, the Day of the *Summer Solstice*. Then will G L be to G N, as was said above, as 209 : 600.

$$\begin{array}{rcl}
 \text{Therefore, Rad. } \dagger 600 & \text{—————} & 12.7781513 \\
 & \text{— 209 —————} & 2.3201463 \\
 \hline
 \text{Tang. } 70^{\circ} 47' 42'' & \text{—————} & 10.4580050
 \end{array}$$

= the Arch S H, the *Sun's Meridian Altitude*, the Day of the *Summer Solstice*, at *Marseils*, or *Bizantium*, according to the Antients. If we suppose the *Latitude* of the Place to be $43^{\circ} 5'$ = the Arch Q Z ; then Q H, the Height of the *Equator* there, will

dows at Noon ; and which, it is possible, was

Q 2

begun

will be $46^{\circ} 55'$: And the Arch Q S = the greatest Declination of the *Ecliptic*, will be $= 23^{\circ} 52' 42''$. *Gassendus* says, *Massiliæ, Proportio Gnomonis, ad Umbram Solstitii Æstivi, pronunciari potest, ut 89,328 ad 31,750 ; seu dimidiando, ut 44,664 ad 15,875 ;* and the correct Height of the Sun's Centre, he makes to be $70^{\circ} 11' 15''$, the Day of the Summer Solstice. — *Quare & Altitudo Poli, seu Latitudo Massiliensis, efficietur 43 grad. 19 min. 9 sec. Quòd si habeamus exquisitam Tychonicam tum Parallaxin 59 sec. tum maximam Declinationem 23 grad. 31 min. 30 sec. perspicuum est, Poli Altitudinem, seu Latitudinem Massiliæ, prodituram 43 grad. 19 min. 36 sec. Op. Tomi. 4. pag. 526. Again, Non est quod insistam in Comparatione Gnomonis abs me usurpati, cum eo, quo olim usus Pytheas — Patiere solum, ut cum ille Gnomonem suum divideret in Particulas 600, eliciam, si nos eandem Divisionem usurpavissemus, prodituram fuisse Umbram, Partium $213 \frac{1}{4}$. Quare & Numeris reductis, pronunciari posse à nobis, Proportionem esse Gnomonis ad Umbram, qualis 120 ad $42 \frac{1}{2}$, præter quadrantem unius quintæ, cum ille pronunciaverit ut 120 ad $41 \frac{2}{3}$. — Agnosco & lætor pro tuo Instituto (nempe *Wendelini*) Rem succedere, quando ex tuâ Parallaxi, maximæque Declinatione sequitur, ut prisca Pythæ Temporibus, *Eclipticæ Obliquitas* extiterit grad. 23. min. 52. uti ex *Tychonicâ* grad. 23. min. $53 \frac{1}{4}$ cujusmodi esse debuisse, ipse quam proxime supponis. *ibid. pag. 527.**

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begun by *Anaximander* ; or *Anaximenes*, according to *Pliny* (y).

WHETHER of these two was really the Person that began to do this, will make little Difference in the Time, when the *Greeks* became first acquainted with the Invention, and probably, with that of the *Divisjon of the Day into twelve Parts*.

FOR how the *Babylonians* could divide the Day in this Manner, without a *Gnomon*, is not easy to conceive ; but the Application of it, to *Astronomical* Purposes, seems to be entirely owing to the Sagacity of the *Greeks*. And that they did so all along after this will be apparent, as we proceed with

(y) *Umbrarum hanc Rationem, & quam vocant Gnomonicon, invenit Anaximenes Milefius, Anaximandri de quo diximus, Discipulus, primusque Horologium quod appellant Sciotericon Lacedæmone ostendit. Nat. Hist. lib. 2. cap. 76.*

with this History, and particularly from *Meto* (z); who, the Year before the *Peloponnesian War*, or 432 before *Christ*, observed the *Solstice* by one; a Thing much celebrated by Authors, and which indeed was the first of the Kind that can be depended on for certain. But this will be a farther Confirmation to us of the Inaccuracy of former *Observations*, since this celebrated *Astronomer* appears to have been mistaken a whole Day. That *Solstice* is by *Ptolemy* (a) said to have been *Ann. Nabon.* 316, *Phamenoth* 21, or *June* 27; but, according to *Petavius* (b), the true *Solstice* was at *Athens*, that Year, *June* the 28th, 10ⁿ 13'. Nor is this at all to be

(z) *Ptolemy's Syntax.* pag. 62.

(a) Ἐκείνη μὲν γὰρ ἀναγράφεται γεγενημένη ἐπὶ Ἀψευδῆς ἀρχοῦ ὁ Ἀθήνησι, κατ' Αἰγυπτίας Φαμενώθ $\overline{\text{KA}}$ πρώτας, ἡμεῖς δὲ τὴν ἐν τῷ προκειμένῳ $\overline{\text{TEI}}$ ἔτει, ἀπὸ τῆς Ἀλεξάνδρου τελευτῆς, ἀσφαλῶς ἐπελογισάμεθα γεγονέναι τῇ $\overline{\text{IA}}$ τῇ Μεσορῇ μετὰ β' ὥρας, &c. *Ptol. ibid.*

(b) *Var. Dissert. ad Uranolog. lib. 6. cap. 10.*

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be wondered at, since *Hipparchus* (c), about the 150th *Olympiad*, or 157 Years after this, was not certain, that he was *not mistaken the fourth Part of a Day*. And even now, since this Science has received such vast Improvements, it is the Opinion of *Hevelius* (d), that “*though the Solstices be taken by*
“*the*

(c) Ἄλλ’ ἐπὶ μὲν τῶν τροπῶν, ἐκ ἀπελπίζω, καὶ ἡμᾶς, καὶ τὸν Ἀρχιμήδην, καὶ ἐν τῇ τήρησει, καὶ ἐν τῷ συλλογισμῷ, διαμαρτάνειν, καὶ ἕως τελευτῆς μέρους ἡμέρας. *Ptol. Syntax. pag. 60.*

(d) See *Gregory's Astronom. pag. 224. At vero Sostiniorum Ratio longe intricatior est — quanta hic Incertitudo, quamque lubrica sit Observationum Via, ob tantillam tot Dierum Declinationem, quis non videt? Cum Æquinoctii verum Tempus, intra Horæ quadrantem definivisse, Herculeum plane sit facinus. — Si enim Loca lucidiorum Planetarum Jovis & Veneris, per fixas ante subducas & constituas, atque inde Solis Meridiani Ascensionem rectam deducas, — haud erit operosum, Solis verum in Zodiaco Locum definire, atque inde ex Motu diurno, Solis in Tropica puncta Ingressum depromere. Sed Opus plenum Sollicitudinis est & multiplex. Snellii Observat. Hassiac. pag. 99, 100. See a Method of Dr. Halley's for finding the Time of the Solstice in *Greg. Astron. pag. 221*, and in *Philosoph. Trans. for the Year 1695.**

“ the most exact Observers, and by the
 “ largest and best Instruments, yet can
 “ they not be determined within a few
 “ Minutes.” This Astronomer (Meto)
 likewise corrected the Year; and in the
 4th Year of the 86th Olympiad, ac-
 cording to *Diodorus Siculus* (e), pub-
 lished his Cycle of 19 Years, called
 the Cycle of the Moon, or from his
 own Name, the *Metonic*.

IN the Year before Christ 535 flour-
 ished *Pythagoras*, famous in Antiquity
 for his residing in *Egypt*, and con-
 versing with the Priests (f); and par-
 ticularly,

(e) Ἐν δὲ ταῖς Ἀθήναις Μέτων ὁ Πανσανί-
 μιν υἱός, δεδοξασμένῳ δὲ ἐν Ἀστρολογίᾳ, ἐξέθη-
 κε τὴν ὀνομαζομένην ἑνεακαιδεκαετηρίδα, τὴν ἀρ-
 χὴν ποιησάμενῳ ἀπὸ μηνὸς ἐν Ἀθήναις Σκισροφε-
 ριώνος τρισκαιδεκάτης ἐν δὲ τοῖς εἰρημέναις ἔτεσι
 τὰ ἄστρα τὴν ἀποκατάστασιν ποιεῖται, καθάπερ
 ἐνιαυτὸς τινὸς μεγάλῃ τὸν ἀνακυκλισμὸν λαμβάνει·
 διὸ καὶ τινὲς αὐτὸν Μέτωνῳ ἐνιαυτὸν ὀνομάζουσι.
 pag. 305.

(f) *Ægyptum petiit, ubi Literis Gentis ejus af-
 suefactus,*

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ticularly, for founding a Sect, that seem to have claimed this Science as their peculiar Province. That he was himself the Inventer of the System that goes under his Name, or learnt it of the *Egyptians*, is more than is probable; for, had this been the established System of that People, it is scarce to be imagined that *Plato*, 192 Years after this, should have been ignorant of it; or, if not ignorant, should have voluntarily relinquished it for another. For, if *Laertius* (g) may be depended on, he placed “ *the Earth in the Center*,
“ *with*

suesfactus, præteriti Ævi Sacerdotum Commentarios scrutatus, innumerabilium Seculorum Observationes cognovit. Valer. Max. lib. 8. cap. 7. Καὶ ἐν Ἀιγυπτίῳ μὲν τοῖς Ἱερέεσσι συνῆν, καὶ τὴν σοφίαν ἐξέμαθον, καὶ τὴν Ἀιγυπτίων Φωνὴν. Porphy. Vit. Pythag. pag. 185. See too Diog. Laert.

(g) Εἶναι δὲ ὑπὲρ μὲν τὸν τῆς γῆς κύκλον Σελήνην, ἐν δὲ τῷ ἐχομένῳ ἡλίῳ, ἐν δὲ τοῖς ἐπάνω τῶν Πλάνηταις γῆν ἴσαν δ' ἐπὶ τῷ μέσῳ κινεῖσθαι περὶ τὸ μέσον. *Vit. Platon.* And thus *Alcinous*; Σελήνην μὲν δὴ τῷ μετ' αὐτὴν ἐπέθηκε

“ with a diurnal Motion about its own
 “ Axis; in the next Place the Moon,
 “ then the Sun, and next of all the
 “ Orbits of the Planets.” Plutarch (b)
 indeed informs us, that, in his old
 Age, he repented that he had not as-
 signed the *Earth* its proper Place.
 The Meaning perhaps is, that, in his
 more advanced Years, he found by
 Reasoning and Experience, that this

R Position

θηκε κύκλῳ τῷ πρώτῳ, ἥλιον δὲ εἰς τὸν δεύτερον
 ἔταξε, φωσφόρον δὲ, καὶ τὸν ἱερὸν Ἑρμῆ λεγόμε-
 νον ἀστέρα, εἰς τὸν ἰσολαχῇ μὲν ἡλίῳ κύκλου
 ἰούλια, τότε δὲ ἀφεσῶτα· ὑπερθευ δὲ τὰς ἄλλας
 κατὰ σφαῖραν οἰκεῖαν· τὸν μὲν βραδύτατον αὐτῶν,
 ὑπὸ τῇ τῶν ἀπλανῶν κείμενον σφαίρᾳ, ὃν Κρόνος
 τινὲς ἐπονομάζουσιν ἀστέρα· τὸν δὲ βραδύλητι δεύ-
 τερον μέλα τῷτον, Διὸς ἐπώνυμον, ὑφ' ὃν τὸν
 Ἄρεω. *De Doctrina Platonis, cap. 14.*

(b) Τὴν δὲ γῆν, ὅτε ἀκίνητον, ὅτε ἐν μέσῳ
 τῆς περιφορᾶς ἔσαν, ἀλλὰ κύκλῳ περὶ τὸ πῦρ
 αἰωρεμένην (nempe νομίζουσιν οἱ Πυθαγορικοὶ)
 ταῦτα δὲ καὶ Πλάτων φασὶ πρὸς ἐπὶ
 γενόμενον διανοεῖσθαι περὶ τῆς γῆς, ὡς ἐν ἐτέρᾳ
 χώρᾳ καθεσώσης, τὴν δὲ μέσσην καὶ κυριωτάτην,
 ἐτέρῳ τινὶ κρείττονι προσήκυσαν. *Vit. Numæ,*
pag. 67.

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Position of the *Earth* would not satisfy *Phænomena*: Or he was, perhaps, better informed afterwards by *Philolaus*, his Contemporary; who, according to *Laertius* (*i*), was by some affirmed to be the first that asserted the *annual Motion* of the *Earth*.

IT is true, in *Pythagoras's* Time, the *Greeks* had begun to compare the Distances of the *Planets*, the *Sun*, and *Moon*, with each other. But, when the Distance of the *Sun* from the *Earth* was made only three Times, or, at most, six Times the Distance of the *Moon* from it (*k*); it is plain that this Part of *Astronomy* was but in its

(*i*) Δοκεῖ δὲ αὐτῷ τὴν γῆν κινεῖσθαι κατὰ κύκλον, πρῶτον εἰπεῖν· οἱ δὲ Ἰκέταν Συρακυσίου φασίν. *Vit. Philolai*. And so *Plutarch*, Φιλόλαος δὲ ὁ Πυθαγόρειος, κύκλῳ περιφέρεισθαι περὶ τὸ πῦρ, κατὰ κύκλου λόγῳ. *De Placit. Philof. lib. 3. cap. 13*. The following Words, ὁμοιότροπος ἢ λίψ καὶ σελήνη, must be corrupt.

(*k*) So *Empedocles* made it. See Note (*x*).

its very Childhood. It is, farther, a convincing Proof, that they had not as yet any *Tables* for calculating the Motions of the *Moon*, or the *Diameters* of the *Earth's Shadow* in *Lunar Eclipses*, or determining the *Parallaxes* in *Solar* ones; without which *Tables*, in the Judgment of our best *Astronomers* (1), neither the Times nor Quantities of *Eclipses* can be investigated.

THAT the System, called the *Pythagorean*, grew up amongst the Disciples of that *Philosopher* is highly probable; but that he himself delivered it to them, in the Form we now have it, seems, as was said, by no means Fact. The Veneration, paid to their Master by that School, is well known to have amounted to a Degree of Superstition; who then would have dared to make the least Alteration, in

R 2

what

(1) *Flamsteed. Histor. Cælest. Brit. Tom. 3. pag. 11.*

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what *Pythagoras* had sanctified with his Approbation? And yet, if that Opinion, which ascribes the present Position of the heavenly Bodies to him, be true, such an Alteration they did make, beyond all Contradiction. For they affirmed (*m*), we are told, “ *That the Revolution of Saturn composed the great Year, equal to 30 of ours. That Jupiter, the next, performed his Course in 12; Mars in 2; the Sun, Mercury, and Venus together, in 1 Year; and the Moon in a Month.*” And with this Position

(*m*) Μετὰ δὲ τὴν ἀπλανῆ, ὁ τῷ Κρόνῳ τέτακται ἀστὴρ, καὶ οἱ ἐφεξῆς πλανῆται ἕξ, ὁ τῷ Δίῳ, Φημι, ὁ τῷ Ἄρει☿, ὁ τῆς Ἀφροδίτης, ὁ τῷ Ἑρμῇ, ὁ τῷ Ἡλίῳ, ὁ τῆς Σελήνης. *Phot. Bibliothec. pag. 1316.* — ὅτι μέγαν ἑαυτὸν καὶ τὴν τῷ Κρόνῳ περιόδον φασίν· ὅτι τῶν λοιπῶν ἕξ πλανημένων ἐν ἐλάττω χρόνῳ ἕτ☿ ἐν τριάκοντα τὸν δικεῖον δρόμον ἀπαρτίζει· ὁ μὲν τῷ Διὸς ἐν ἰβ' ἔτεσι τὸν ἴδιον διαπεραίνει κύκλον· ἐν δυσὶ δὲ ὁ Ἄρης, ὁ δὲ Ἡλιός☿ ἐνιαύτῳ· Ἑρμῆς δὲ καὶ Ἀφροδίτη, ἰσοταχεῖς τῷ Ἡλίῳ· Σελήνη δὲ προσγεοτάτη, καὶ ἐλάχιστον κύκλον περιῖσται, ἐν μηνί. *Ibid. pag. 1317.*

Position agree Plato (n), Chrysippus (o),
and Tully (p).

WHAT

(n) See above, Note (g).

(o) Τῶν δὲ πλανωμένων ὑψηλοτάτην εἶναι, με-
τὰ τὴν ἀπλανῶν, τὴν τῷ Κρόνῳ, μετὰ δὲ ταύ-
την, τὴν τῷ Διὶ, ἔτα τὴν τῷ Ἄρει, ἐφεξῆς
δὲ τὴν τῷ Ἑρμῇ, καὶ μετ' αὐτὴν, τὴν Ἀφροδίτης,
ἔτα τὴν τῷ ἡλίῳ, ἐπὶ πᾶσι δὲ τὴν τῆς Σελήνης
πλησιάζουσιν τῷ αἴρι. Stobæus Phys. Eclog. lib. I.
cap. 25.

(p) *Ea quæ Saturni Stella dicitur, Φαίνων quæ à
Græcis nominatur, quæ à Terra abest plurimum, 30
ferè Annis Cursum suum conficit : In quo Cursu multis
mirabiliter efficiens, tum antecedendo, tum retardando,
tum vespertinis Temporibus delitiscendo, tum matutinis
rursum se aperiendo, nihil immutat sempiternis Sæculo-
rum Ætatibus, quin eadem iisdem Temporibus efficiat.
Infra autem hanc propius à Terra Jovis Stella fertur,
quæ Φαίδων dicitur : Eaque eundem 12 Signorum
Orbem Annis 12 conficit, easdemque, quas Saturni
Stella, efficit in Cursu Varietates. Huic autem proxi-
mum inferiorem Orbem tenet Πυρόεις, quæ Stella Mar-
tis appellatur : Eaque 24 Mensibus, 6, ut opinor,
Diebus minus, eundem lustrat Orbem, quem duæ supe-
riores. Infra autem hanc Stella Mercurii est ; ea
Στίλβων appellatur à Græcis : Quæ Anno ferè ver-
tente signiferum lustrat Orbem, neque à Sole longius
unquam unius Signi Intervallo discedit, tum antever-*
tens,

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WHAT Time the *Planets* began to be observed, is not known; but that they were all discovered at the same Time, is hardly probable. They were at first, no doubt, considered only as fixed *Stars*; by Degrees they were found to have a Motion of their own; and, at last, their Periods came to be taken notice of, and settled. But this, we are assured by *Seneca* (q), was not so early as the Time of *Democritus*, that is, about 500 Years before *Christ*. Those of the Planets *Jupiter* and *Mars* seem, if Conjecture may be allowed, to have been the first

tens, tum subsequens. Infima est quinque errantium Terræque proxima, Stella Veneris, quæ Φωσφόρος Græcè, Lucifer Latinè, dicitur, cum antegreditur Solem; cum subsequitur autem, Hesperos. Ea Cursum Anno conficit, & Latitudinem lustrans signiferi Orbis & Longitudinem; (quod idem faciunt Stellæ superiores) neque umquam à Sole duorum Signorum Intervallo longius discedit, tum antecedens, tum consequens. Tull. de Nat. Deor. pag. 176, Edit. Dav.

(q) See above, Note (b).

first that were so. The *Stations* and *Retrogressions* indeed of *Jupiter* and *Mars* would extremely perplex their Theories; but as their Motions are soon discernable, and they come in opposition to the *Sun*, they seem more likely to have been observed than *Saturn*; whose *Retrogressions*, though not so large as those of the other two, yet the Slowness of whose Motion, and the *Weakness* of his *Light*, would all contribute to make him less distinguished from the fixed *Stars* about him. The Planet *Venus*, we have already seen, was known to *Homer* (*r*), by the Name of *Hesperus*; but *Pythagoras*, if *Laertius* (*s*) and *Pliny*

(*r*) See above, Note (*m*). This same *Star*, though not known perhaps for the same, seems to be denoted in *Isaiah*, by the Name *חֵלֶל בֶּן שָׁחַר* *Heilal, Son of the Morning*, chap. xiv. 12. And, as it is used in a Prophecy against *Babylon*, was the Name perhaps by which it went amongst the *Chaldean* Observers.

(*s*) Πρώτον τε Ἐσπερον καὶ Φωσφόρον τὸν αὐ-
τῶν

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Pliny (t) may be credited, or else *Parmenides* (u), was the first that said, *Phosphorus* and *Hesperus* were the same, i. e. I suppose, discovered the *Circular Motion* of that *Planet*. When *Mercury* began to be considered, as having a regular Motion of his own,

is

τὸν ἐπειν, ὡς Φησὶ Παρμενίδης, or, as *Casaubon* corrects the Words, οἱ δὲ Φασὶ Παρμενίδην. *Vit. Pythag.* Ἀπολλόδωρος ἐν τῷ δευτέρῳ περὶ Θεῶν Πυθαγορείαν εἶναι τὸ περὶ τέτων, αὐτὸν εἶναι Φωσφόρον τὸ καὶ Ἑσπερον, δόξαν. *Stob. Phys. Ecl. lib. 1. cap. 25.*

(t) *Infra Solem ambit ingens Sidus, appellatum Veneris, alterno Meatu vagum, ipsisque Cognominibus æmulum Solis ac Lunæ, præveniens quippe & ante matutinum exoriens Luciferi Nomen accipit, ut Sol alter Diem maturans contra ab Occasu refulgens, Lucem videntque Lunæ reddens. Quam Naturam ejus Pythagoras Samius primus deprehendit, Olympiadem circiter XLII. qui fuit Urbis Romæ Annus 142. Nat. Hist. lib. 2. cap. 8.* The first Person that called the Star *Venus Lucifer*, was, according to *Achilles Tatius*, *Ibycus*. Πρῶτος δὲ Ἰβυκος εἰς ἓνα συνέτειλε τὰς προσηγορίας. *In Arat. Phænomen. pag. 136.*

(u) Καὶ δοκεῖ πρῶτος πεφωρακέναι, τὸν αὐτὸν εἶναι Ἑσπερον καὶ Φωσφόρον, ὡς Φησὶ Φαβρίγιος ἐν τῷ ὑπομνημονευμάτων· οἱ δὲ Πυθαγόραν. *Laert. Vit. Parmen.*

is uncertain; but it is probable not 'till afterwards, as he is so seldom seen (x), his greatest Elongation being only about $22^{\circ}. 46'$.

FROM this Time, however, it is probable their Motions began to be observed, and *Geometry* to be applied to

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(x) *Simili Ratione sed nequaquam Magnitudine aut Vi, proximum illi (Ven.) Mercurii Sidus, à quibusdam appellatum Apollinis, inferiore Circulo fertur, novem Diebus ociore Ambitu, modo ante Solis exortum, modo post occasum splendens, nunquam ab eo viginti tribus Partibus remotior. Plin. Nat. Hist. lib. 2. cap. 8.* Here we see *Pliny* makes the Orbit of *Mercury* the lowest; on the contrary, above, Note (r), *Tully* placed *Venus* lowest, and with that Hypothesis agreed the *Chaldeans* and *Archimedes*, if *Macrobius*, lib. 1. cap. 19. may be depended on. *Neque de trium superiorum Ordine, (adds he) quem manifestè clarèque distinguit immensa Distantia, neque de Lunæ Regione, quæ ab omnibus multum recessit, inter Veteres aliqua fuit Dissentio. Horum vero trium sibi proximorum, Veneris, Mercurii, & Solis Ordinem vicinia confudit. Sed apud alios. Nam Ægyptiorum Solertiam Ratio non fugit, quæ talis est. Circulus, per quem Sol discurrit, à Mercurii Circulo ut inferior ambitur. Illum quoque superior Circulus Veneris includit: Atque ita fit ut hæ*
duo

we are now speaking of, lived *Cleostratus*, who, according to *Pliny* (y), formed the *Signs* of the *Zodiac*; unless he means only the Constellations *Aries* and *Sagittary*, concerning which, he says, he composed a Treatise. He formed the *Kids* likewise, according to *Hyginus* (z); the Constellation *Heniochus* being probably formed before. By such easy Gradations did that People proceed, and from such small Beginnings; 'till, in the Time of *Eudoxus*, or the Year before *Cbrist* 363, there might be read in the *Heavens* the antient History of their most illu-

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strious

(y) *Signa deinde in eo Cleostratus, & primum Arietis ac Sagittarii. Plin. Nat. Hist. lib. 2. cap. 8.* The Division of the *Zodiac* into 12 Parts *Macrobius* makes to be the Invention of the *Egyptians*. For the Manner by which they did it see *Som. Scip. lib. 1. cap. 21*; and above, Note (g).

(z) *Hos autem Hædos Cleostratus Tenedius dicitur primus inter Sidera ostendisse. Poet. Astron. lib. 2*

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strious Families during the *poetical Ages* (a).

THIS Philosopher was an *Astronomer*, *Physician*, and *Law-giver*. He learnt *Geometry* of *Archytas*, and was recommended by *Agesilaus* to *Nectanebo*,

(a) This is said with respect to the *Sphere* of the *Greeks*; for, if *Achilles Tatius* may be depended on, other Nations had other *Constellations* of their own. Ἐν διαφοροῖς ἔθνεσι διάφορα καὶ τὰ ὀνόματα τῶν ἄστρον ἐστὶν εὐρεῖν. Ἐν γὰρ τῇ τῶν Αἰγυπτίων σφαίρῃ, ὅτε ὁ Δράκων ἐστὶν νομιζόμενος ἢ ὀνομαζόμενος, ὅτε ἄρκιοι, ὅτε Κηφεύς, ἀλλ' ἕτερα ὀνόματα εἰδῶτων, καὶ ὀνόματα τιθειμένα. Ἔτω δὲ καὶ ἐν τῇ τῶν Χαλδαίων. Ἕλληνες δὲ ταῦτα τὰ ὀνόματα ἔθεντο τοῖς ἄστροις ἀπὸ ἐπισήμων ἡρώων, πρὸς τὸ εὐκατάληπτα εἶναι καὶ εὐγνώστα· ἀνώνυμα γὰρ ὄντα πολλὴν παρῆχε ταραχὴν τοῖς περὶ ταῦτα σπουδάζουσιν. *In Arat. Phaenom. pag. 164.* The Forms of the *Constellations*, even in the *Spheres* of the *Greeks*, have not been always exactly the same, as Mr. *Flamsteed* well observes, *Hist. Cælest. Brit. Tom. 3. pag. 154.* Καὶ ταῖς διαμορφώσεσι δ' αὐταῖς ταῖς καθ' ἑκάστων τῶν ἀστέρων, ὃ ΠΑΝΤΩΣ ΣΥΓΚΕΚΡΗΜΕΘΑ ΤΑΙΣ ΑΥΤΑΙΣ, αἷς Οἱ ΠΡΟ ΗΜΩΝ καθάπερ ὃδ' ΕΚΕΙΝΟΙ ΤΑΙΣ ΕΤΙ ΠΡΟ ΑΥΤΩΝ, ἀλλ' ἑτέραις πολλαχῇ κατὰ τὸ δικαιότερον

nebo, King of Egypt, and by him to the Priests; with whom he staid a Year and four Months, and wrote his *Oſtaeteris*, according to *Laertius* (b). For, there it was that he learnt, that the *Sun* finished his Course in 365 Days and 6 Hours; a Thing which, it seems, was hitherto unknown to the *Greeks* (c). He wrote, amongst other Things,

δικειότερον καὶ μάλλον ἀκόλουθον τῷ ἐνυῦθμῳ τῶν διατυπώσεων, οἷον ὅταν ᾖ ὁ ΠΗΠΑΡΧΟΣ ἐπὶ τῶν ΩΜΩΝ τῆς ΠΑΡΘΕΝΟΥ τίθῃσιν ΗΜΕΙΣ ἐπὶ τῶν ΠΛΕΤΡΩΝ αὐτῆς καλονομάζομεν, ἔσ' α *Ptol. Syntax. lib. 7. cap. 4. pag. 172.*

(b) *Εὐδοξος Ἀιγίνης, Κνίδιος, ἀσρόλογος, γεωμέτρης, ἰατρὸς, νομοθέτης — εἰς Ἀιγυπτίον ἀπᾶραι μετὰ Χρυσίππου τῷ Ἰατρῷ, συστατικὰς φέροντα παρ' Ἀγησίλαου πρὸς Νεκλάναντον τὸν δὲ τοῖς ἱερεῦσιν αὐτὸν συστήσαι καὶ τέτταρας μῆνας πρὸς ἐνιαυτῷ διατρίψαντα αὐτόθι, ξυρόμενον τὴν ἥβην καὶ ὄφρ' αὖ, τὴν ὀκλαίηρίδα κατὰ τινὰς συγγράψαι. As to this last Particular, *Hanc ὀκλαίηρίδα, says Cenforinus, vulgò creditum est ab Eudoxo Cnidio institutam; sed hanc Cleostratum Tenedium primum ferunt composuisse, ἔσ' postea alios aliter.* De Die Nat. cap. 18.

(c) See Note (x). Hence *Lucan* makes *Julius Caesar*

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Things, a Treatise on the *Constellations*, which is lost, all but a few Fragments that are preserved by *Hipparchus* on *Aratus*, whose *Sphere*, according to him, is the very same with that of *Eudoxus* (d).

THE Obliquity of the *Ecliptic*, as we have seen, was known long before; and the *Signs* of the *Zodiac* invented, for the better knowing the *Sun's Place*. Then, and scarce before, the *Colures* were settled, and drawn passing through the Middle of the *Signs* (e). Thus, for Example, the *Equinoctial*

Cæsar say, *Phars. lib. 10*,

Nec meus Eudoxi vincetur Fastibus Annus.

(d) Ὅτι μὲν ἐν τῇ Εὐδόξου περὶ τῶν Φαινομένων ἀναγραφῇ κατήκολληθηκεν ὁ Ἀράτος, μάθοιμεν ἂν τις διὰ πλειόνων, παρατιθεὶς τοῖς ποιήμασι αὐτοῦ περὶ ἐκάστων τῶν λεγομένων, τὰς Εὐδόξου λέξεις. *Apud Petav. Uranolog. pag. 173.*

(e) This Position was not always the same
amongst

Equinoctial Colure is described by *Eudoxus*; but how inaccurately is easy to see. "The *Equinoctial Colure*, says "he (f), passes through the Left-hand of *Arctophylax*, through the Middle of *Chelæ*, the Right-hand and Fore-knees of the Centaur, through the South Pole, the Flexure of the River, and the Head of *Cetus*, the Back of *Aries*, the Head and Right-hand of *Perseus*."

HAD *Eudoxus* told us the particular *Star*, for Instance, in the Back of *Aries*, or the Middle of *Chelæ*, through which the *Colure* passed, we should have been much better able, than we are

amongst the Antients. Βύλονται δὲ τροπὴν αὐτὸν (Solem) ποιεῖσθαι οἱ μὲν περὶ τὰς ἀρχάς, οἱ δὲ περὶ ὀγδόην μοῖραν, οἱ δὲ περὶ ιβ', οἱ δὲ περὶ ιε' τῷ Καρκίνῳ· says *Achilles Tatius*, pag. 146.

(f) Ἐν δὲ τῷ ἐτέρῳ κολούρῳ φησὶ κειῖσθαι ὁ μὲν τὴν ἀριστερὰν χεῖρα τῷ ἀρκτοφύλακι, καὶ μέσα αὐτῇ κατὰ μέσην· εἴτα τὰ μέσα τῶν χηλῶν

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are at present, to distinguish its Position, and form Conclusions about it. But, since that was hardly to be expected at that Age, we are left at Liberty to chuse what *Stars* we please near the Middle, and which, of course, must render all our Reasonings precarious and uncertain. The *Longitudes* and *Latitudes* of the *Stars* were, I suppose, unknown 'till the Time of *Hipparchus*; and therefore we must not wonder, if a *Colure* was drawn through the *Right-band* and *Fore-knees* of the *Centaur*; which is as impossible, as that one drawn through *Bayer's Star*, η or τ , in the *Head* of *Perseus*, should pass through the *Star*, by him marked *b* or \times in the *Hand*.

W H A T

λὼν κατὰ πλάτος· καὶ τῷ Κεντάυρῳ τὴν δεξιὰν
χειρᾶ, καὶ τὰ ἐμπρόδια γόνατα· μετὰ δὲ τὸν
ἀφαιῖ πόλον, καμπὴν τε τῷ ποταμῷ, καὶ κήτης
τὴν κεφαλὴν, καὶ τῷ κριῦ τὰ νῶτα κατὰ πλάτος,
καὶ τῷ Περσείῳ τὴν κεφαλὴν, καὶ τὴν δεξιὰν χειρᾶ.
Petau. Uranolog. pag. 208.

WHAT Time the *Colures*, thus rudely described as they are, had this Position assigned them, is very hard to say. Sir *Isaac Newton* (g) has, with great Accuracy, given us *Colures*, passing through several *Stars*, and distinctly adjusted to the End of the Year 1689. Dividing then the Sum by the Number of Errors, he determines the *Colure* of the Antients to have passed at that Time through $8^{\circ} 29' 13''$. *Eudoxus* flourished, according to *Menagius* (h), about the 103d *Olympiad*, or 363 Years before *Christ*. The Interval between this and the Year 1689 is 2052 Years. The *Præcession*, answering to this, is $27^{\circ} 21' 36''$; which, subtracted from $1^{\circ} 6^{\circ} 29' 13''$, gives $9^{\circ} 7' 37''$ of γ , the Place of the *Colure* in the Time of *Eudoxus*. But since he describes it as passing through

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(g) *Chronol.* pag. 86. 91.

(h) *Observat. in Vit. Eudoxi*, pag. 392.

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the Middle of that Sign, if by the *Middle* he means the 15th Degree, it had gone back from the Place, where it had been first fixed by those whose *Observations* he followed, $5^{\circ} 52' 23''$. The *Præcession*, corresponding to this, gives 440 Years; which, reckoned back, will bring us to the Year before *Christ* 803, or 28 Years before the 1st *Olympiad*. But, as this seems to be a Period much too early for the Purpose, (since it could hardly be drawn through the *Middle* of the *Signs*, before the *Signs* were formed) and one *Colure*, as described by Sir *Isaac Newton* (i), goes through $8^{\circ} 7' 12'' 40''$, and another through $8^{\circ} 4' 56'' 40''$, the Difference between which is $2^{\circ} 16'$, *Eudoxus* might well be mistaken thus much, or even more, in assigning the Position of it. The *Præcession* for $2^{\circ} 16'$ is 170 Years; so that the *Colure*

(i) *Ut sup. Note (g).*

lure might not be placed in the Middle of the *Signs*, 'till the Year before *Christ* 633, i. e. 46 Years before the *Death* of *Thales*. But, since *Cleostratus* is said by *Pliny* (*k*) to have formed the *Signs* of the *Zodiac*, after *Anaximander* had found out the *Obliquity* of the *Ecliptic*, about 90 Years after this; if we suppose, what might easily be, a Mistake of three Degrees in his Observation, the *Precession* for which is 237 Years; it will not be improbable, that *Cleostratus* (*l*) was contemporary with *Anaximander*, and that he himself drew the *Colures* through the *Middle* of the *Signs*.

ABOUT the 121st Olympiad, or 72 Years after this, and 291 Years before *Christ*, lived *Timocharis*, a di-

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(*k*) *Ut sup. Note* (*y*).

(*l*) For the Age of *Cleostratus* is not exactly known. The learned Mr. *Dodwell* places him, *Ann. Per. Jul.* 4170, i. e. 543 Years before the vulgar *Christian Æra*. *De Cycl. Vet.* pag. 180.

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ligent Observer; but whose Works are all lost in the Ruins of Time, excepting a few *Observations* preserved in *Ptolemy's Syntaxis (m)*. In the 126th Olympiad, or 20 Years after this, and 271 before *Christ*, was born *Eratosthenes (n)*; a Person skilled in all Parts of

(m) And from thence in *Street's Astronom. Carolin.* pag. 104, 108. "In the Year before *Christ*, says he, 283, *January* the 29th, in the End of the third Hour of the Night, *Timocharis* diligently observed the Southern Middle of the *Moon* falling upon the third and middle *Star* of the *Pleiades*. And in the Year before *Christ* 272, *October* the 11th, 15^h reduced to *London*, *Timocharis* observed & applying near to the former *Star* of the Left Wing of *♊*." It is only about this Time, as Mr. *Flamsteed* observes, that the Antients first made any Observations on the Places of the fixed Stars. *Aliquas tamen de fixarum Locis accuratas Observationes, ante Timocharidis & Aristilli, vel eque- dem Hipparchi Tempora, factas fuisse, ullis Veterum Reliquiis & Monumentis nobis non liquet. Flamst. Hist. Cœlest. Brit. Tom. 3. pag. 17.*

(n) *Ερατοδίνης Ἀγλαῦ (οἱ δὲ Ἀμβροσίῳ) Κυρηναῖος, Μαθητὴς Φιλοσόφου Ἀρίστωνος. Χῆς, γραμματικῷ δὲ Λυσανίῳ τῷ Κυρηναίῳ, καὶ Καλλυμάχῳ τῷ*

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of Learning, particularly *Astronomy* and *Geography*. The only Remains of his Works are a Fragment or two; one upon the *Asterisms*, and another, his Manner of determining the Measure of a great Circle of the *Earth* by the *Gnomon* (o); besides what is cited from him by *Strabo* (p).

SOMEWHERE about this Time flourished *Aristarchus Samius*, but in what Year is uncertain. That he was prior to *Archimedes*, is apparent from his *Arenarius* (q), where he quotes him

τῷ Ποιητῇ μελετήματα δὲ ἐξ Ἀθηνῶν ὑπὸ τοῦ τρι-
του Πτολεμαίου, καὶ διέτριψε μέχρι τοῦ πέμπτου
διὰ δὲ τὸ δευτερεύειν ἐν παντὶ εἶδει παιδείας, τοῖς
ἄλλοις ἐχθίσαντα, Βητὰ ἐπεκλήθη· οἱ δὲ καὶ δευτε-
ρον ἢ νῦν Πλάτωνα· ἄλλοι Πύλαθλον ἐκάλεσαν·
ἐτίχθη δὲ καὶ Ὀλυμπιάδῃ, καὶ ἐτελεύτησεν πρὶ ἐπὶ
γεγονώς. *Suid. in voc.*

(o) See at the End of *Aratus*, Edit. Oxon. 1672.

(p) *Geograph. passim.*

(q) Ἐποτίθεται γὰρ τὰ μὲν ἀπλανῆ τῶν
ἄστρον καὶ τὸν ἥλιον μένειν ἀκίνητον, τὰν δὲ γὰρ
περιφέρειν περὶ τὸν ἥλιον κατὰ κύκλῳ περιφέ-
ρουν,

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him as the Asserter of the *Earth's* annual Motion round the *Sun*; as *Hicetas*, a *Syracusan*, according to *Laertius* (*r*), and *Tully* (*s*), on the Authority of *Theophrastus*, supposed the *diurnal* one about its own *Axis*. This
Philoso-

πειαν, ὅς ἐστιν ἐν μέσῳ τῷ δρόμῳ κείμενος. *Arenar.* pag. 6. See *Stob. Phys. Eclog. lib. 1. cap. 25*. By what Method *Aristarchus* collected the annual Motion of the *Earth* is no where said, that I know of. That this was not asserted by him upon any demonstrative Principles appears from hence, that *Ptolemy* and his Followers rejected it. Could the annual *Parallax* of the fixed *Stars* have been determined with any Certainty, the Question had been long since decided. The annual Motion of the *Earth*, however, now seems to be past Contradiction, from Sir *Isaac Newton's* Doctrine of Gravitation. The accurate Observations, likewise, of the present ingenious *Sav. and Royal Professor of Astronomy, Philosoph.* *Transf.* Number 406, are a farther Proof of it.

(*r*) See above, Note (*i*).

(*s*) *Hicetas* *Syracofius*, ut ait *Theophrastus*, *Cælum, Solem, Lunam, Stellas, supera denique omnia stare censet, neque præter Terram Rem ullam in Mundo moveri: Quæ, cum circum Axem se summa Celeritate convertat & torqueat, eadem effici omnia, quasi stante Terra Cælum moveretur.* *Academ. pag. 228, Edit. Dav.*

Philosopher gave an extraordinary Instance of Sagacity and mathematical Skill, when he determined, from the *Moon's Dichotomy* (*t*), the Distance of the *Sun* from the *Earth* to be more than eighteen, and less than twenty Times the Distance of the *Moon* from the *Earth*; and that the Diameter of the *Sun* was to the Diameter of the *Moon* in the same Proportion; but the Diameter of the *Sun* to that of the *Earth* in a greater Proportion than 19 to 3, and less than 43 to 6.

ABOUT

(1) Ἐπιλογίζεσθαι ἐν τῷ τῷ Ἡλίου ἀπόστημα ἀπὸ τῆς Γῆς τῷ τῆς Σελήνης ἀποσθήματι μείζον μὲν ἢ ὀκτώκαιδεκαπλάσιον, ἑλασσον δὲ ἢ εἰκοσιπλάσιον, διὰ τῆς περὶ τὴν διχασμίαν ὑποθέσεως. Τὸν αὐτὸν δὲ λόγον ἔχειν τὴν τῷ Ἡλίῳ διάμετρον πρὸς τὴν τῆς Σελήνης διάμετρον. Τὴν δὲ τῷ Ἡλίῳ διάμετρον πρὸς τὴν τῆς Γῆς διάμετρον, μείζονα μὲν λόγον ἔχειν, ἢ ὅν τὰ 19 πρὸς 3, ἑλασσονα δὲ ἢ ὅν 43 πρὸς 6. *Aristarch. pag. 5. Edit. Wal-lis. 1688.*

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ABOUT the Year of Rome 542, or 211 before Christ, flourished the great *Archimedes*; who, besides that he was an excellent *Mathematician*, was, in the proper Sense of the Word, as good an *Astronomer*. That he observed the *Solstice*, is certain from *Hipparchus* (u); and *Macrobius* (x) tells us, that he “ assigned the Distance of the Moon from the Earth, “ Mercury

(u) See above, Note (c)

(x) Et Archimedes quidem Stadiorum Numerum deprehendisse se credidit, quibus à Terræ Superficie Luna distaret, & à Luna Mercurius, à Mercurio Venus, Sol à Venere, Mars à Sole, à Marte Jupiter, Saturnus à Jove. Sed & à Saturni Orbe usque ad ipsum stelliferum Cœlum, omne Spatium se Ratione emensum putavit. Lib. 2. cap. 3. Ἐμπεδοκλῆς διπλάσιον ἀπέχειν τὴν Σελήνην ἀπὸ τοῦ Ἥλιου ἢ περὶ ἀπὸ τῆς γῆς· οἱ ἀπὸ τῶν Μαθηματικῶν, ὀκτώκασιδεκαπλάσιον· Ἐξατοδίνης τὸν ἥλιον ἀπέχειν τῆς γῆς σαδίων μυριάδας ἑξομῆκοις ὀκτώ. *Plutarch. de Placit. Philosoph. pag. 892.* Instead of τὸν ἥλιον it should be τὴν Σελήνην. The Edition printed at *Francfort*, 1620, is in this Place corrupted.

amongst the Antients. 145

“ Mercury from the Moon, Venus
 “ from Mercury, the Sun from Venus,
 “ Mars from the Sun, Jupiter from
 “ Mars, and Saturn from him, in Sta-
 “ dia; as likewise the Distance from
 “ the Orbit of Saturn to the fixed
 “ Stars.”

ABOUT the 150th Olympiad, or
 175 Years before Christ, flourished
Hipparchus, who observed the *Autum-
 nal Equinox*, *A. V. C.* 592, according
 to *Ptolemy* (y); and the *Vernal Equi-
 nox*, *A. V. C.* 626; so that he seems
 to have continued his Observations for
 34 Years together. *Geometry* having
 now, as we have seen, been taken
 in to the Assistance of *Astronomy*; and
 the *Pythagoreans* (z) having invented
 the thirty-second *Proposition* of the first

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Book

(y) *Syntax.* pag. 60.

(z) "Ευδημος δὲ ὁ Περιπαλητικὸς εἰς τὰς Πυ-
 θαγόρειας ἀναπέμπει τὴν τῷδε τῷ Θεωρήματος ἔν-
 ρειαν. *Procl. in Prop.*

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Book of *Euclid*, this Philosopher was enabled in a more correct Manner to attempt the *Parallax* (*a*) of the *Sun*; and a noble Attempt indeed it was. But, though it discovers a vast Comprehension of Thought, and the uncommon Skill of the Contriver, yet it supposes too great an Accuracy of Observation ever to be admitted into Practice. For, as hath been made appear by our best modern *Astronomers* (*b*), a very small Mistake in this Method, (from which the most diligent *Observers* are not secure) will make a very considerable Difference in the *Sun's Distance*. And this, I suppose, has been the Reason, why the Method of *Aristarchus* (*c*) has generally had the Preference; though it labours under equally
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(*a*) *Keil's Astron. pag. 258; Ptolemy's Syntax pag. 126, and Ricciol. Almagest. Nov. Tom. 1. lib. 3. cap. 7.*

(*b*) *Whiston's Astron. Lect. pag. 70.*

(*c*) *Ricciol. Almag. Nov. Tom. 1. lib. 3. cap. 7. See Whiston's Astron. Lectures, pag. 71, 72.*

as great a Want of Accuracy. He first began to make a *Catalogue* of the fixed Stars, a Thing highly celebrated by *Pliny* (d) as a *Task* for a God; and discovered the *Præcession* of the *Equi-*

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nox,

(d) *Idem Hipparchus nunquam satis laudatus, ut quo nemo magis approbaverit Cognationem cum Homine Siderum, Animasque nostras Partem esse Cœli; novam Stellam & aliam in Ævo suo genitam deprehendit, ejusque Motu, qua Diu fuisse, ad Dubitationem est adductus, anne hoc sæpius fieret, moverenturque & eæ quas putamus affixas. Idemque ausus Rem etiam Deo improbam, annumerare posteris Stellas, ac Sidera ad Normam expangere, Organis excogitatis, per quæ singularum Loca atque Magnitudines signarent, ut facile discerni posset ex eo, non modo an obirent nascerenturque, sed omnino aliqua transirent moverenturque, item an crescerent minuerenturque; Cœlo in Hæreditate cunctis relicto, si quisquam, qui Rationem eam caperet, inventus esset. Nat. Hist. lib. 2. cap. 26. The Catalogue of this Astronomer, according to *Pliny* here, cap. 41, says Mr. *Flamsteed*, contained the Places of 1600 Stars in 72 Constellations. *Ptolemy* gives the Places of 1022 Stars in 48 Constellations. Hist. Cœlest. Brit. Vol. 3. pag. 22. He therefore justly enquires, what is become of 24 Constellations, and 578 Stars. But, since (as he observes there, pag. 23.) the Catalogues of the *Arabs* are the same with *Ptolemy's*, and *Ptolemy's* the same with that of *Hipparchus*,*

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nox, as *Ptolemy* (e) informs us. He is said to have calculated *Eclipses* both of the *Sun* and the *Moon*, for 600 Years to come; “*Menses Gentium, Diesque & Horas, ac Situs Locorum, & Vicos Populorum complexus,*” says *Pliny* (f).

AND

chus, allowing $2^{\circ} 40'$, for the *Præcession* 'till his Time, it seems as if the *Arabs* had never any other Copies of *Ptolemy*, than what we have now; and that *Pliny* was mistaken, or misinformed, a Thing not unusual with that Author.

(e) *Syntax. pag. 59.* This *Præcession* was made by this *Astronomer* to be one Degree in 100 Years; but, by comparing together former and later Observations, it has been found to be 1 Degree in 72 Years. *Ptolemæus enim* (says Mr. *Flamsteed*) à *Tempore, quo Hipparchus suas finivit Observationes, ad Antonini Imperium, (cujus Imperio ineunte suas fecit ipse Ptolemæus) Annos computat 265, quibus antrosum moverunt fixæ per $2^{\circ} 40'$, vel propemodum per unum Gradum, ut asseverat, centum Annorum Spatio. Veterum autem Observationes cum istis nostri Temporis conferendo, verus fixarum Motus reperitur fore $3^{\circ} 41'$, Spatio Annorum 265.* *Hist. Cœlest. Brit. Vol. 3. pag. 16.* See too *Street's Astron. Carolin. pag. 21.*

(f) *Nat. Hist. lib. 2. cap. 12.*

AND this brings us down to the Year 140 after *Christ*, when *Ptolemy* observed the *Equinox* (g), and composed his excellent Work; a Work, that conveys very extraordinary Conceptions of its Author; but at the same Time hardly permits us to imagine, that the *Egyptians* his Countrymen, or the *Babylonians*, ever knew the true *System*, as the World has been since obliged with it by *Copernicus*. Different Parts of it, indeed, lay scattered in the different Writings of the *Pythagorean* Philosophers, and others; but that it was never reduced to one consistent Form, and admitted as the genuine one, seems apparent from *Ptolemy's* embracing a worse. If others were acquainted with what is now called the *Pythagorean* System, it is certain it was lost, or obscured by the superior Authority of *Ptolemy's*. It was this
that

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that was publickly taught, and privately explained and commented on. It was translated at last into the *Arabic* Language, and by that People studied and admired. The Knowledge of the *Almagest* was by them looked on as the *ne plus ultra* of Science (*b*); and though many of them were very diligent and accurate Observers (*i*), yet

(*b*) *Vide Abulfarag. Hist. Dynast. passim.*

(*i*) From the Time of the Caliph *Al. Maimun.* who died *Ann. Heg. 218, (Christi 833)* *Astronomy* was studiously cultivated by the *Arabs*. Under this Prince lived, أحمد بن كثير الفرغاني صاحب المداخل الي علم هيئة الافلاك يحتوي علي جوامع كتاب بطليموس باعذب لفظ وايين عبارة Ahmed Eben Cothair Al. Farganensis (*seu* Al. Fraganus) *Introductionis ad Astronomiam Autor, in qua comprehendit Regulas generales Operis Ptolemaici, Verbis suavissimis & Explicationibus luculentissimis.* Abulfarag. Hist. Dyn. pag. 161. This Author was printed at *Amsterdam* in the Year 1669, with curious Notes by *Golius*. About the Year of the *Heg. 279, (Christi 892)* we find *Jacobus Al Cendi* taken notice of by this same Author, pag. 179, for an excellent *Astronomer*. About *Ann. Christi 880, Albategnius* made Observa-

yet not one of them pretended to call in Question its Principles, or to prefer any other *System* before it. In Europe

Observations on the *Præcession* of the *Equinox*. For, as he himself says in his Book, *De Scientia Stellarum*, cap. 52. pag. 202, he has added $11^{\circ} 30' 20''$ to the Places of the Stars, as set down by *Ptolemy*. See *Greg. Astron.* pag. 167. This Author made his Observations at *Araçia* in Syria: The original *Arabia* was never yet published, but lies among the MSS in the *Vatican*: It was translated into a most barbarous Latin by *Plato Tiburtinus*, and printed first at *Norimberg*, A. D. 1537, and afterwards at *Bononia*, A. D. 1645, with Notes by *Regiomontanus*. *Abulfaragius* gives this Character of him ; ولا يعلم احد من الاسلام بلغ مبلغه في تصحيح ارساد الكواكب
منه Neque de quopiam sub Islamismo constat, qui quod ad exactas Astrorum Observationes, & Motuum eorum Indagationem, ad Gradum ipsius pertigerit. About Ann. Heg. 660, (*Christi* 1261) flourished *Nassir Eddin Ettusi*, a very careful Observer at *Maraga*, a considerable Town in *Aderbijan*. He called his Tables *Tabulas Ilchanicas*, from the *Tartar* Prince of that Name, whom this *Astronomer* excited to make War upon *Mostaafem*, the last *Caliph* of *Babylon*; and which put an End to the Government of the *Abbasidae*, after it had lasted 500 Years. His Table of the Longitude

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rope indeed, during this Interval, *Astronomy* was in a manner unknown, or entirely lost. What little there was confined itself almost wholly to the *Moors* in *Spain*. At last, about the Year 1230 after *Christ*, at the Command of the Emperor *Frederick*, *Ptolemy's*

gitude and *Latitude* of Places was published by *Graves*, and may be seen too among *Hudson's Geogr. Minor*. Another considerable *Astronomer* was *Abulfeda*, born, as he says himself, *Ann. Heg.* 672, (*Christi* 1273) and who died, according to *Al Gannabi*, *Ann. Heg.* 733, (*Christi* 1332.) See *Gagnier's* Preface to this Author's Life of *Mohammed*, pag. 6, and 9. And, to mention no more, *Ulugh Beigh*, a Descendant of the famous *Tamerlane*, was a very good *Astronomer*. He was put to Death by his own Son, *Ann. Heg.* 853, (*Christi* 1449.) See *Pococke's Supplement to Abulfarag. Hist. Dyn.* pag. 6. His Catalogue of the fixed *Stars*, rectified to the Year of *Christ* 1437, was published, with excellent Notes by *Dr. Hyde*, at *Oxford*, 1665. This Prince reigned at *Samarchand* above 40 Years. How accurate he was in his Observations appears from hence, that he determined the Height of the *Pole* there to be $39^{\circ} 37' 23''$. See *Graves's* Preface to *Ulugh Beigh's* Tables of the *Longitude* and *Latitude* of Places in *Hudf. Geogr. Minor. vol.* 3.

amongst the Antients. 153

lenny's *Almagest* (k) was translated out of Arabic into Latin.

FROM this Time *Astronomy* may date its second Birth, being gradually improved, by the concurrent Labours of 500 Years, to the Perfection it is now arrived at. For, about the Year 1250, flourished the famous *Alphonfus*, King of *Castile*, celebrated for his *Astronomical Tables* (l). He was succeeded, about the Year 1507, by the incomparable *Copernicus* (m), the Author of the *System* now admitted for

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the

(k) *Keil's Preface to his Introduction to Astronomy*, pag. 10.

(l) These Tables were published in the Year 1252. He was assisted in the forming them by *R. Isaac. Aben. Sid*, called *Hazan*. They cost him 40,000 *Ducats*, or, as some say, 400,000. This Prince died *A. D.* 1284, aged 81. Vid. *Weidler. Hist. Astron.* pag. 279.

(m) *Copernicus* was born, at *Thorn* in *Prussia*, January 19, *A. D.* 1472. His Works were printed at *Basil*, *A. D.* 1566. See *Weidler. Hist. Astron.*

pag.

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the true one, as being most agreeable to the Laws of Gravitation, and the best Observations. Amongst these last, the principal Place is due to those of *Tycho Brahe* (*n*); as by the Help of which the ingenious *Kepler* (*o*) was enabled to lay down the true Laws of Motion, that obtain amongst the heavenly Bodies.

N o

pag. 342. 346. This famous *Astronomer*, as we have seen, composed his System out of the Discoveries of several Persons. *Hicetas* supposed the Diurnal Revolution of the Earth about its own Axis; *Aristarchus* the Annual one about the *Sun*; and the Position of the Planets, *Mercury* and *Venus*, he adopted, as appears from what *Macrobius* says above, from the *Egyptians*.

(*n*) *Tycho's* Catalogue of 777 fixed Stars, composed for the Year 1600, was first published in the Year 1610, in his *Astron. Instaur. Progym.* and afterwards, with 223 Stars more of his own observing, in the *Rudolph. Tables*, A. D. 1627. *Greg. Astron.* pag. 169.

(*o*) He was born *December 27, A. D. 1571*; and, after a Life spent in struggling with great Difficulties, left it for a better, *November 15, 1631*.

No sooner was that Discovery made, than this Science took very hasty Strides towards Perfection, by the unwearied Diligence and Sagacity of many able *Astronomers* and *Mathematicians*, particularly our own Country-men, *Ward* (p), *Flamsteed* (q), *Halley* (r), and, above all, Sir *Isaac Newton*.

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FROM

(p) See his *Astronom. Geomet.* printed at London, 1656, and dedicated to Sir *Paul Nele*, *Hevelius*, *Gassendus*, *Bullialdus*, and *Ricciolus*; all of them Persons to whom *Astronomy* is highly indebted.

(q) He was born at *Derby*, August 19, 1646, and died at *Greenwich*, December 31, 1719. His *Historia Cœlestis Britan.* was first published, A. D. 1722; and again, after his Death, in 1725.

(r) He published a Catalogue of 350 *Southern Stars*, observed by him at *St. Helen's*, corrected to the Year 1677 compleat. See likewise above, *Note* (d), pag. 118, and *Philosoph. Transact.* Numb. 348, where he has given a Method of determining the Distance of the *Sun*, by observing the *Transit* of *Venus* over his *Disk*. In *Philosoph. Transf.* 349, he has given an Account of that *Planet's* appearing many Days together, that Summer, in the Day-time.

FROM what has been here laid together then it appears, that though the *Egyptians* and *Babylonians* may be allowed, by their Observations of the Heavens, to have laid the Foundation of *Astronomy*; yet, that, as long as it continued amongst them, it consisted of *Observations* only, and nothing more. That in this State it lay, even amongst the *Greeks*, for some Time; 'till *Geometry* being improved by *them*, and *them alone*, into a *Science*, and applied to the Heavens, they became the true and proper Authors of every Thing deserving the Name of *Astronomy*.

AND now, Sir, had I not detained you so long already, I should offer at some Apology for addressing you at all upon this Subject, and especially for the Manner in which I have treated it: But, as your known extensive Learning and Abilities will secure me, from
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the Imputation of intending to instruct you, in any Thing you was not before acquainted with, I persuade myself you will not be displeased, to see brought together, under one View, the Materials I have here collected, and which lie scattered in a Variety of Authors. What is here offered is not intended for Masters, like yourself, but Readers of my own Size. The main Design is to do Justice to the *Greeks*, and restore to them the *Honour* of *inventing*, what the World generally supposes them only to have *borrowed*. An Honour that has been, by I know not what Fatality, hitherto enjoyed by *Slaves*, to the Prejudice of a *People*, whose *publick Spirit* and *Love of Liberty* claim both our Admiration and Imitation. How far the *Sciences* suffer, where Oppression, Superstition, and arbitrary Power prevail, that once *glorious Nation* affords at this Day too melancholy a Proof: But this would lead
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me too far. Thus much however, and at *this Time*, I could not help saying to you, as none are so sensible of the Advantages of Learning, as those that are truly learned themselves. To you the *Greeks* submit their Cause. The Place you fill with so much Reputation, more immediately points out you for their Patron. They only beg they may not suffer through the Want of Skill in their Advocate, who likewise recommends himself to your well-known Candour; and begs Leave to subscribe himself, with the highest Esteem and Respect,

S I R,

Your most Obedient,

Humble Servant,

G. C O S T A R D.

E R R A T A.

PA G. 2, line 13, read *Lustre*. Pag. 3, line 17, read ἐκ πλίνθιν. Pag. 9, line 29, for πρὸ τοῦ ἑσώτατος, read προεσώτατος. Pag. 25, line 25, dele *and at the End of Scarburgh's*, &c. Pag. 27, line 21, read ἐκκῆ. Pag. 42, line 25, read ποιεῖν, and dele ἡ. Pag. 44, line 15, read בועמהם, line 20, read טהר. Pag. 45, line 10, read מבכות. Pag. 46, line 13, read الرحا. Pag. 51, line 24, read الفلك, and dele و; line 25, read واحكامها. Pag. 52, line 15, read تصحيح; line 16, read, لاصحابه & ارضادا. Pag. 53, line 8, after Σελήνης, read μοιρῶν. Pag. 74, line 17, for *at Night*, read *in the Morning*. Pag. 88, line 14, for Note (q) read Note (s). Pag. 89, lin. 11, for *Strabo* read *Herodotus*. Pag. 106, lin. 3, and 9, for † read †. Pag. 126, lin. 27, for Note (h) read Note (x). Pag. 131, lin. 23, for Note (q) read Note (h). Pag. 133, line 29, for Note (x) read Note (n). Pag. 134, line 22, after τὰς read τῶ. Other lesser Mistakes, particularly in the *Greek Accents*, the Reader is desired to correct as he sees Occasion.

